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EFFECTS OF A SCRIPTED ONLINE VIDEO ON SCHOOL NURSE PERCEPTIONS OF CONCUSSION MANAGEMENT

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EFFECTS OF A SCRIPTED ONLINE VIDEO ON SCHOOL NURSE PERCEPTIONS OF CONCUSSION MANAGEMENT

by

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Dedication

This dissertation is dedicated to Caleb, my cherished grandson. It is my hope that the work of this study and all the studies that follow in this important field will prevent you from ever experiencing the negative effects of a concussion.

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Abstract

EFFECTS OF A SCRIPTED ONLINE VIDEO ON SCHOOL NURSE PERCEPTIONS OF CONCUSSION MANAGEMENT

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Media attention surrounding the increased rates and serious consequences of concussions among American youths has instigated the passage of laws in all fifty states requiring improved management of concussions and the development of programs, such as the Center for Disease Control and Prevention, *Heads Up to Concussion*. Progress has been reported in the efficacy of concussion diagnosis and return-to-play decisions. However, there has been less progress in managing the protocols for cognitive rest and return-to-classroom. The purpose of this study was to identify significant stakeholders and factors that could improve management of cognitive rest and return-to-classroom protocols in high school students. A multidisciplinary concept analysis identified cognitive rest as a key component of concussion management. A descriptive pilot study, based upon the Theory of Planned Behavior, was conducted to explore the norms in concussion management and perceptions of school nurses in Texas. A new instrument, The Schneider Concussion Care Survey was developed and tested. The results of the

pilot study were also employed to develop a study that tested the effect of a video modeling a conversation between a school nurse and a school principal, suggesting the development of a concussion care management team. Although the results for the intervention were statistically non-significant, the study identified study variables that affected the intention of school nurses in return-to-learn management and supported the Decomposed Theory of Planned Behavior. The overall results supported the need for further research among stakeholders in concussion management in order to impact the health of concussed students.

Key Words: concussion, school nurse, cognitive rest, return-to-learn, scripted video

Chapter 1

Overview of the Program of Research

Approximately 136,000 children and adolescents in the United States experience sports-related concussions every year (Meehan, d'Hemecourt, & Comstock, 2010). The medical expenses and loss of productivity that result from concussions cost an estimated $12 billion annually in the United States alone (Zhou & Brodsky, 2015). A concussion results from a direct blow to the head or impulsive forces transmitted to the head, resulting in functional, not structural, damage to the brain (McCrory et al., 2013). The injury causes a metabolic imbalance and an energy crisis that lasts from seven to ten days, accounting for the symptoms (Erdtmann, 2015). Concussion symptoms include headache, nausea, dizziness, alteration in sleep patterns or fatigue, sensitivity to light or noise, mood changes, visual problems, and cognitive issues (Sarmiento et al., 2010). Additionally, concussed students demonstrated decreased academic performance, impaired social function, slower reaction times, sleep disturbances, and higher rates of clinical depression (Kontos et al., 2012).

Although most concussion symptoms resolve within two weeks, the recovery period can be marked with significant emotional and cognitive symptoms that have a negative impact on the health and well-being of students (Kontos, 2012). Some individuals experience severe neurological consequences throughout the remainder of

their lives (McCrory et al., 2013). In a study by Morgan et al. (2015), researchers reported that risk factors for more serious sequelae, such as postconcussion syndrome, were higher among individuals who had a personal or family history of mood disorders and migraines. Additionally, those who had a delayed onset of symptoms were at higher risk for negative outcomes (Morgan et al., 2015). Zhou and Brodsky (2015), reported that dizziness, the second most common symptom of concussions, was predictive of a prolonged recovery. Multiple studies reported that children had different criteria for recovery and increased recovery periods than adults (Covassin et al., 2012; Field et al., 2003; Choe et al., 2012; Ma et al., 2012).

Clinicians traditionally treat concussed youth with physical and cognitive rest. Cognitive rest is defined as increasing hours of sleep, refraining from attending school, avoiding homework or reading, and not using computers or video games (Moser et al., 2012). Premature return-to-play or return-to-classroom was found to exacerbate concussion symptoms (McCrory et al., 2013). Conversely, prolonged rest was also found to delay recovery (Thomas et al., 2015). Little research provided criteria for cognitive rest or the duration that provided optimal outcomes and the prescribed course relied on the opinion of the provider (Baker et al., 2015). Despite the differing approaches of clinicians, the majority recommended a transitional approach to return-to-activity, monitoring symptoms to guide the progression (Burke et al., 2015).

One challenge of concussion management is that concussed students must self-report their symptoms. Parents, coaches, teammates, and fans influence student-reporting behaviors. Kroshus et al. (2015) also reported that the feedback a student received when reporting symptoms greatly influenced future reporting behavior. When students

experienced pressure to continue playing or negative responses to self-reports of concussion symptoms they were much less likely to report concussion symptoms later (Kroshus et al., 2015). Another factor that had a negative impact on self-reporting by adolescents was the lack of proper medical personnel. When students had frequent, active interactions with a health care provider, including information about the consequences of not reporting symptoms or premature activity, students had increased reporting behaviors (Kay et al., 2015).

Due to the large amount of publicity surrounding concussions, laws were passed in all fifty states that require coaches and athletic trainers receive training in concussion recognition and management. The Center for Disease and Control also developed a comprehensive concussion-training program for all stakeholders (Appendix A) in concussion care (Centers for Disease Control and Prevention, 2014). Kay et al. (2015) reported that despite enhanced training, there was little evidence to suggest that improved knowledge among coaches and athletic trainers improved behavior related to concussion management. Moreover, Carzoo et al. (2015), found that coaches, regardless of their training, and non-coaching faculty had similar knowledge levels about concussion management. They also reported that educators either did not comprehend or retain the information in the training they received and did not understand why students required academic accommodations (Carzoo et al., 2015).

In 2012, the National Association of School Nurses (NASN) issued a position statement that directed school nurses to become active members of the team that assisted concussed students returning to school (Diaz & Wyckoff, 2013). School nurses are not only trained in assessment, but are familiar with the implications of the student's medical

history and academic accommodations. School nurses are also skilled at monitoring the symptoms students experience and revising their return-to-classroom plan accordingly. Finally, school nurses are adept at educating concussed students about the consequences of under-reporting their symptoms during therapeutic conversations and providing positive feedback to encourage further reporting behavior (Diaz & Wyckoff, 2013). Thus, this program of research is focused on the role of school nurses in concussion management and the factors that contribute to improved outcomes.

Theories

Multiple studies have employed the Theory of Planned Behavior to examine concussion care management. In the Theory of Planned Behavior, Azjen (2006) postulated that attitude, subjective norms, and perceived behavioral control contributed to intention, which in turn, was correlated with behavior. Kroshus et al. (2014) found a correlation between concussion reporting intention and concussion reporting behavior. Register-Mihalik et al. (2013) reported relationships between knowledge and attitude with reporting intentions. Chrisman et al. (2013) utilized an expanded Theory of Planned Behavior model to explain concussion reporting behavior. Both the Theory of Planned Behavior and the expanded theory, or the Decomposed Theory of Planned Behavior were utilized in this program of research.

Introduction to Articles

Cognitive Rest: A Concept of Importance for School Nurses

Health care providers recommend cognitive rest for concussed students who have sustained a concussion, but the concept has rarely been defined. Guided by Walker and Avant (2011), a concept analysis, using a multidisciplinary approach, was conducted.

Cognitive Rest: A Concept of Importance for School Nurses, presented in Chapter 2, was published as *Cognitive Rest: An Integrated Literature* was published in *The Journal of School Nursing* (Appendix A). Permission to include the manuscript is found in Appendix B. Three defining attributes of cognitive rest were established: freedom from physical or mental discomfort; abstinence from mental exertion; and mental and emotional balance. The information presented in this article forms the foundation for a protocol that enables school nurses to form return-to-classroom protocols that can be adapted to individual students and school settings.

The Role of School Nurses in Concussion Management: An Exploratory Study

In the next step of this program of researcher, an instrument, the Schneider Concussion Care Survey (Appendix C) was developed in order to explore the knowledge of school nurses related to concussions, school policies related to communication about concussions, and factors needed in order for nurses to feel supported and ready to manage cognitive rest/return-to-classroom protocols. The instrument was a cross-sectional descriptive survey based on the Theory of Planned Behavior, using the concepts of attitude, subjective norms, and perceived behavioral control. Chapter 3 presents this pilot study, entitled *The Role of School Nurses in Concussion Management: An Exploratory Study*. After approval for the study was obtained from The University of Texas at Tyler Institutional Review Board (Appendix D), the survey was distributed to members of the Texas Association of School Nurses through Qualtrics®. The results of the pilot study indicated two key points that were used to develop the subsequent interventional study. First, the school nurses survey identified their school principal as the person they perceived as most supportive of a concussion management team. Second,

communication problems among stakeholders in concussions among students was identified as major concern.

The psychometric evaluation of the instrument was tested through factor analysis with orthogonal rotation and the results suggested retaining five factors. The results of this portion of the study were reported in an article entitled, *Psychometric Evaluation of a New Instrument to Evaluate School Nurses' Perceptions on Concussion Care Management,* and accepted for publication in the *Journal of School Nursing* (Appendix E). Permission to include the manuscript is found in Appendix B.

Effects of a Scripted Online Video on School Nurse Perceptions of Concussion Management

The intervention developed for the subsequent study stemmed from the results reported in the pilot study: concerns related to communication among stakeholders and the identification of principals as potential supporters of a concussion management team. The interventional scripted online video (SOV) modeled a conversation between a school nurse and the school principal (Appendix F), explaining the impact of concussions on students and proposed a plan for developing a concussion care management team, with the school nurse's focus on return-to-learn protocols.

Because the pilot study identified a factor not fully addressed in the Theory of Planned Behavior, the Decomposed Theory of Planned Behavior was used to guide the revision of The Schneider Concussion Care Survey (Appendix G) for the intervention study. The five factors identified in the pilot study were retained and an additional 10 questions were added to address the antecedents in the theory. An additional eight questions were added to the intention section. After being reviewed and approved by a

panel of experts and the Institutional Review Board of the University of Texas at Tyler (Appendix H), the survey was approved by the National Association of School Nurses (Appendix I) and distributed to their members through a link in two subsequent newsletters distributed in the fall of 2016. The randomized controlled study compared two groups who viewed two different media presentations that discussed concussion care management. The intervention group viewed a SOV and the attention control group viewed a standard power point (Appendix J). Participants electively agreed to continue in the study and completed a follow-up survey. Data were analyzed to determine the effect of the intervention and the correlation of study variables. The results of the study are reported in Chapter 4, *Effects of a Scripted Online Video on School Nurse Perceptions of Concussion Management.*

Chapter 2

Cognitive Rest: A Concept of Importance for School Nurses

Abstract

Cognitive rest has been suggested as a treatment for school athletes who have sustained a concussion, but the concept has rarely been defined. The purpose of this article is to provide a comprehensive definition of cognitive rest, based on an integrative literature review. The method of synthesis was guided by Avant and Walker's concept analysis procedure. The importance of rest is discussed as a nursing intervention and model cases are presented to clarify the concept. Three defining attributes of cognitive rest are established: freedom from physical or mental discomfort; abstinence from mental exertion; and mental and emotional balance. Empirical referents are given as well as a suggested protocol to enable school nurses to form cognitive rest and return-to-classroom protocols that can be adapted to individual school settings.

Keywords: cognitive rest, concussion, return-to-learning, accommodations, head injury, integrated literature review

Cognitive Rest: A Concept of Importance for School Nurses

Cognitive rest is prescribed for injuries or disorders related to mental processing or for individuals who experience stress in a fast-paced modern world (Klein, 2014). In order to rest cognitively, an individual needs to refrain from any activities that are mentally challenging (McLeod and Gioia, 2010). However, inadequate rest is experienced in epidemic proportions within all populations in the United States, with 25% described as sleep-deprived (Cox Sullivan, 2015). According to Narrow (2000), "rest is one of the oldest and most effective forms of therapy, and yet providing it remains one of the most complex of all nursing problems" (p. 96). Nonetheless, nurses understand that, despite the challenges, promoting rest in patients is central to their recovery (Narrow, 2000). Even though health care providers frequently prescribe rest for patients, the concept is not well defined and may be interpreted very differently by various individuals. There is even more ambiguity when the phrase cognitive rest is used.

The Concept of Cognitive Rest

Literature Search

A definition of rest was derived from literature searches through CINAHL, Web of Science, and *Fundamentals of Nursing: The Art and Science of Nursing Care* (Taylor, LeMone, & Lillis, 2011). The original search was limited only by English language and yielded 126 sources. The articles were reviewed and eleven were selected. Criteria for selection included rest when used as a treatment for human disorders. Articles were eliminated when rest was used as a treatment for animals and when "rest" was used as an acronym for unrelated terms. A second search was conducted in CINHAL, Web of Science, and Medline, using the key words "cognitive rest, adolescent, athlete, and

concussion." The original fifty-seven citations were narrowed to forty-six sources by the limiters of 2010-2015 and English language. The remaining articles from the second search were reviewed and narrowed to fifteen articles. Articles were eliminated when they included treatments outside the scope of practice for nurses or were not consistent with protocols defined by the CDC and the 4th International Conference on Concussion in Sport Consensus Statement (McCrory et al., 2013).

Taylor, LeMone, and Lillis (2011) describe rest as "a condition in which the body is in a decreased state of activity, with the consequent feeling of being refreshed" (p. 1080). Hammond (1891), a former surgeon general, posited that there was no complete rest for the body during life. He suggested that rest simply meant alternating focus between physical and mental labors, as well as incorporating activities that were amusing. Dueholm (2014) found that most individuals fought rest, because they equated a rest period to giving up something essential to life. Despite not defining "rest," several studies describe the value of rest as a treatment for pathological conditions. For example, a study completed by Crespo, Fernandez, Abody, and Mojon (2013) found that rest had a positive impact on blood pressure and other cardiovascular conditions. Byrne et al. (2015) described improved myocardial perfusion at rest in diabetic patients using computer tomography. Researchers also found that anxiety and disorders of the skeletal or neurological system responded positively to rest (Byrne et al., 2015). The increment of time needed for rest that afforded improvement of underlying conditions was not stipulated by any of the researchers and must be determined after considering individual factors and responses by each patient (Abody & Mojon, 2013; Byrne et al., 2015; Crespo et al., 2013).

For the purposes of defining cognitive rest, cognition is defined as "the mental process of knowing, thinking, learning, and judging" (Seidel, Ball, Dains, & Benedict,1999, p. 900). Therefore, "cognitive rest" is generally considered to be a bodily state characterized by minimal intellectual activity.

It seems reasonable to assume that sleep or an interruption of activities normally conducted by the brain will restore the mind to efficiency. However, Deco, Jirsa, and McIntosh (2013) suggested that the human brain never actually rests. The question then becomes, what activities must be eliminated for meaningful cognitive rest to occur? According to some scientists, for cognitive rest to occur individuals must refrain from mental exertion (Brnnk, 2014; McLeod and Gioia, 2010; Moser, Glatts, and Schatz, 2012). The activities that must be limited or eliminated included using a computer, reading, texting, taking notes, watching television, playing video games, and talking on the phone. Brnnk (2014) also found that bright lights and loud music must be eliminated to promote cognitive rest. McLeod and Gioia (2010) reported that complete cognitive rest was very difficult to achieve and that the activities should be reintroduced on a continuum. For example, initially students must refrain from attending school or doing homework for one week (Moser, Schatz, Glenn, Kollias, & Iverson, 2015) and eventually they could return to school and engage in classroom activities for thirty to forty-five minute segments (Brnnk, 2014). According to Nurit and Michal (2003), acceptable activities included napping, meditation, listening to soft music, and sitting quietly. Most importantly, the researchers stressed the importance of releasing the resting individual from assignments or the pressure of obligations (Nurit & Michal, 2003).

Because a review of literature did not produce a definition of cognitive rest, applications in areas outside of the context of concussion treatment were examined to add clarity. Within the rail industry, Anderson, Grunstein, and Rajaratnam (2013) reported improved performance in workers within the rail industry after prescribed rest periods. Similarly, Helton and Russell (2015) reported that any task that required vigilance over a lengthy period produced cognitive disengagement and that frequent interruptions from these tasks produced improved performance. In a third article, Gillie and Thayer (2014) suggested that a reduction in cognitive activities was beneficial in treating post-traumatic stress disorders. Nurit and Michal (2003) reported rest improved productivity in anyone who engaged in computer work or activities that required continuous or repetitive actions. They also reported that ergonomists found that frequent short breaks improved feelings of well-being and decreased accidents in workers (Nurit & Michal, 2003).

Defining Attributes

Walker and Avant (2011) state that defining attributes are traits that are always present when an occurrence of the concept happens. When the literature related to rest and cognitive rest was synthesized, several defining attributes emerged. These defining attributes were (1) freedom from physical or mental discomfort, (2) abstinence from mental exertion, and (3) mental and emotional balance. According to Narrow (2000) rest required freedom from physical discomfort and irritation. Additionally, Sullivan et al. (2012) reported that cognitive rest eliminated any activities that required mental exertion, which placed additional stress upon a recovering brain. Finally, Nurit and Michal (2003) described physical and mental rest as a state of balance between inactivity and activities that promoted feelings of peace and serenity.

Conceptual Cases

Model Case

A model case was defined as one in which all of the defining attributes were present (Walker & Avant, 2011). The case developed is as follows:

Dana, a sixteen-year old school athlete, sustained a concussion playing soccer. Her physician prescribed one week of cognitive rest at home. She was to return to school the following week for half-days, attending class for periods of no more than forty-five minutes and resting in the school nurse's office between class sessions. Dana's teachers, counselors, and the school nurse met to form a plan for her return to class following the week she was absent from school. Additionally, all of her exams and homework activities were rescheduled well after her period of cognitive rest. Dana's mother contacted Dana's friends to explain why she would not be using Facebook or be able to return their texts during her week at home. All of Dana's family, friends, teachers, and coaches supported the plan. Most importantly, Dana understood how important this period of rest was to her recovery and she felt free to relax and follow the protocol prescribed by her physician. During the week she rested at home, she listened to music that enhanced relaxation, meditated, and took occasional naps. Her mother checked on her occasionally, providing support and encouragement. After the first day, her headaches rarely bothered her. Also during her week at home, Dana's friends and teammates sent her an edible arrangement of fruit, which made her feel connected to them, and decreased any concern she might have felt related to missing important activities.

In the model case, all of the defining attributes were present. After the first day, Dana was free of pain and she refrained from any activities that were mentally taxing. Due to the preparations made and the support she received, Dana did not experience any anxiety about falling behind at school or feeling isolated from her friends. She understood and accepted the protocol she was to follow. She refrained from performing any tasks that required cognitive challenges and was able to feel a sense of peace and balance in her life.

Contrary Case

The following contrary case is one that does not contain the defining attributes. Jack, a fifteen-year-old football player, sustained a concussion while tackling an opponent. The athletic trainer informed him that he would not be able to return to playing football until his headaches and photophobia were gone. He stayed at home for two days because he was experiencing severe headaches. During the time that he was home, he watched television and played computer games during the day. When his parents returned home at dinnertime, they encouraged him to do his homework so he did not fall behind at school. Jack's friends called and texted him frequently, asking when he would return to school and invited him to a party that weekend. A few days later, he continued to have headaches, but they were less severe, so he returned to school. His teachers were not aware of his concussion and they pressured him to schedule the exams he missed and required all of his missing work within two days. He found that his calculus class made his headaches worse and he failed the calculus examination. His teammates told him he needed to "man up" and play in the game the following weekend because they needed him. Therefore, Jack lied to the athletic trainer and his coach,

telling them he had fully recovered and he started to practice with his team again in less than a week.

The contrary case clearly does not contain any of the defining attributes. Jack experienced both physical and emotional pain during the week following his injury, which hampered his ability to rest. Second, he engaged in activities that were cognitively challenging, which did not allow his brain to rest. Third, his friends, family, and teachers offered little support and pressured him to engage in the very activities that prevented him from resting. Jack, feeling a great deal of anxiety, never experienced any meaningful cognitive rest or mental and emotional balance in his school or home activities.

Antecedents

Walker and Avant (2011) described antecedents as events or incidents that must precede the occurrence of the concept. First, cognitive rest cannot occur without a well-defined plan or protocol that provides relief from uncertainty. Second, support and acceptance from members considered significant to the patient must be present for cognitive rest to occur. Third, relief from feeling pressured or rushed must occur prior to cognitive rest. Fourth, in order for cognitive rest to occur the patient must feel accepted and cared-for.

Consequences

Consequences are events or incidents that occur resulting from cognitive rest (Walker & Avant, 2011). The first consequence of cognitive rest is healing or improvement of the symptoms associated with the underlying disorder. A second consequence of cognitive rest is a shorter recovery time. A third consequence of cognitive rest is improved cognition. An improved sense of well-being is the fourth consequence of cognitive rest.

Empirical Referents

The literature lacks any criteria to measure outcomes, or empirical referents, for cognitive rest outside of its use for treatment of concussions. The resolution of concussion symptoms are best measured by: (1) decreased symptoms demonstrated by improved Post-concussion Symptoms Scale (PCSS) scores (Gibson, Nigrovic, O'Brien, & Meehan, 2013); (2) improved Immediate Post-Concussion Assessment and computerized neurocognitive testing scores (Schatz, Pardini, Lovell, Collins, & Podell, 2006); or (3) visual processing scores that demonstrate effective sensory and nervous system function (Moore, Boglio, & Hillman, 2014).

According to Moore, Boglio, and Hillman (2014) an assessment of cognitive function can be calculated from measurements obtained by electroencephalographic records made while the individual is processing visual stimuli provided by a computer program. Although, this research is promising, it is not practical for use among the many concussed athletes found in high school populations. ImPACT testing may be a valuable tool in measuring outcomes related to cognitive issues, but it requires specialized training and is used most often by athletic trainers or physical therapists. The PCSS is a Likert-like scale that measures concussion symptoms such as headache, nausea/ vomiting, balance problems/dizziness, alteration in sleep patterns or fatigue, sensitivity to light or noise, mood changes (irritable, sad, nervous, or more emotional), visual problems, and cognitive issues (feeling slow or foggy or difficulty concentrating or remembering). The PCSS test is widely available and may prove to be most useful to nurses who are comfortable with using scales to evaluate health disorders. The school nurse would use the scale at

baseline or shortly after the athlete experienced the concussion and again after a period of cognitive rest to determine improvement of concussion symptoms (Kontos et al., 2012).

The Role of the School Nurse

From 1997 to 2012, the rate of concussions rose 200% in 14 through 19-year-old students (Moser, Glatts, & Schatz, 2012). McCrory et al. (2013) describes a concussion as a complex physiological process that affects the brain, resulting in impairment of neurological function. A direct blow to the head or impulsive forces transmitted to the head can cause a concussion. A concussion may resolve quickly or last over an extended period, with longer recovery times found in children and adolescents (McCrory et al., 2013). The acute pathophysiological changes following mild brain trauma last seven to ten days and are used to determine when it is safe for the athletes to resume their normal activities. According to The Center for Disease Control and Prevention (CDC), most states have passed legislation related to concussions in high school sports. The majority of states require concussion training for coaches and students and require the presence of athletic trainers at sporting events. In addition to a training program that many schools use for educating their athletes and staff, the CDC has developed return-to-play protocols for concussed athletes (Centers for Disease Control and Prevention, 2007).

Athletic trainers or physicians most often make the sideline diagnosis of a concussion. If no health care provider is present, suspected concussed athletes should be safely transported to a physician for evaluation. Previous orientation questions have been determined unreliable and should be replaced with assessments of memory, balance, and gait. Because a concussion is an evolving injury, the athlete should not be left alone for several hours, and ongoing assessments should be conducted (McCrory et al., 2013).

When a concussion is suspected, the athlete should not return to play on the day of the injury, nor engage in any physical activity until symptom free. The Consensus Statement on Concussion in Sport recommends a gradual progression from no activity to light interval activity, to sport-specific drills without impact, to more complex noncontact activities, and eventually to full-contact drills. The progression should occur only with medical clearance and if any symptoms reoccur, the athlete should return to the prior level of activity. It must be remembered that many symptoms of concussion may be masked by medications and this should be considered during assessments (McCrory et al., 2013).

During the acute phase, as well as the period that follows the injury, concussions have a variety of clinical symptoms (headache), physical signs (loss of consciousness and amnesia), cognitive impairment (feeling like in a fog and slowed reaction times), neurobehavioral features (liability and irritability), and sleep disturbances (insomnia) (McCrory et al., 2013). Arborgast et al. (2013) also report nausea, sensitivity to light or noise, tinnitus, fatigue, and vision problems. More than 80% of school-aged children had an increase in the severity of their symptoms when they returned to school during the first two weeks after their injury (Gioia, Vaughan, & Reesman, 2010). Conversely, complete cognitive rest for one week decreased symptoms and improved cognitive testing scores (Moser, Glatts, & Schatz, 2012).

While there are developed return-to-play protocols, little research has been done to guide return-to-learning protocols (Halstead et al., 2013). Recent research indicates that 36% of athletes continue to have decreased cerebral blood flow for at least one month (Moser, Glatts, & Schatz, 2012). These athletes demonstrated decreased academic

performance, impaired social function, slower reaction times, and higher rates of clinical depression (Kontos, Covassin, Elbin, & Parker, 2012). Neurologists find that many students require up to one month for recovery, and some require even longer, especially in the adolescent population (McCrory et al., 2013). The response to a concussion in a high school athlete is managed best by a multidisciplinary approach (Hossler et al., 2014). Although school districts may vary on resources and assigned roles, the team should ideally include the family, a health care professional, an academic professional, and an athletic representative. The athletic representative, most often an athletic trainer, has specialized training in preventing head injuries and in examining athletes and diagnosing concussions, as well as helping the athlete return to athletic play. A nurse possesses the skill set that includes patient assessment, care plan development, interventions, and evaluation (Hossler et al., 2014). When present as the onsite health care professional, the school nurse is in an ideal situation to manage the efforts of the team in assisting the student's return to the classroom.

During the initial period of complete cognitive rest, the student should abstain from attending school, doing schoolwork or homework, read, use a computer, play video games, text, or watch television (Arborgast et al., 2013). The concussed athlete may listen to relaxing music or an audiobook, take slow walks outside, meditate, or gently play with pets (Moser et al., 2015).

The student, when symptom-free, may progress to short interval (30-45 minute) learning sessions at home or at school. Between the school sessions, the student should rest in the nurse's office. Because some subjects are better tolerated than others are, the school nurse should continuously monitor the student's symptoms, and adjust the

schedule to decrease exposure to classes that exacerbate symptoms. Frequently band or choir rooms and gymnasiums are areas that are noisy and may need to be eliminated from the initial schedule. The student may also require extra time to get to class to avoid noisy hallways. Other appropriate accommodations include preprinted notes or a designated note taker. Teachers may need to postpone examinations and major assignments or administer verbal assessments (Halstead et al., 2013).

School nurses should make frequent assessments to determine the effectiveness of the schedule and strategies being used. If academic adjustments are needed beyond three weeks, but are within the regular educational environment, academic accommodations under Section 504 of the Rehabilitation Act of 1973 (U. S. Department of Labor, 1973) should be developed (Halstead et al., 2013). When more permanent academic modifications or modifications outside of the regular educational environment are needed, an Individualized Educational Program (IEP) meeting should be initiated (Halstead et al., 2013).

In addition to frequent student assessments and facilitating appropriate academic accommodations, there are many things school nurses should do among stakeholders of concussions among students. First, the school nurse should provide education for counselors, administrators, teachers, and parents related to concussion symptoms, treatment, and the support needed for recovery. This includes cognitive rest guidelines. Second, the school nurse should facilitate communication between parents and all of the student's teachers. It is important for teachers to understand that the student may be experiencing cognitive fatigue that greatly affects certain subjects, such as mathematics. Additionally, the student may experience mood swings, irritability, and fatigue. School

nurses should also provide parents with referrals for specialists, such as neuropsychologists or neurologists, if warranted. Another role school nurses should fulfill is an advocate for concussion prevention, safe-play rules, and academic resources for concussed athletes (Hossler et al., 2010). Headgear may reduce impact to the brain but has not been shown to prevent concussions; therefore, school nurses should initiate programs that emphasize fair play and decrease violence (McCrory et al., 2013). Finally, school nurses should facilitate communication with the athletic staff related to the student's academic progress. Return to play should not occur until the student has successfully returned to the classroom (McCrory et al., 2013).

Conclusion

In 2012, the National Association of School Nurses (NASN) issued a position statement that directed school nurses to become active members of the team that assisted concussed students returning to school (Diaz & Wyckoff, 2013). With an understanding of the concept of cognitive rest, school nurses can develop individualized strategies to implement these protocols within their own school districts. The NASN statement clearly emphasized the need for collaboration among team members. It is essential for school nurses to develop cooperative relationships with athletic trainers and school administrators to allow for effective team management of concussed athletes. Additionally, as the facilitators of cognitive rest protocols, school nurses are in an ideal situation to conduct future studies on the efficacy of cognitive rest in student outcomes. Knowing that adolescents may resist technology restrictions, school nurses might study the efficacy of different approaches to earn the cooperation of the adolescents involved in cognitive rest protocols. In addition to research that can potentially contribute to the

science of nursing, school nurses can make a true difference in the lives of their student athletes.

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Chapter 3

The Role of School Nurses in Concussion Management: An Exploratory Study

Abstract

Significance of problem: The rate of concussions in adolescents has risen 200% over the last decade. Concussed students have increased academic and emotional problems. Neurologists recommend total brain rest for these concussed students during the recovery period, followed by a transitional return-to-classroom protocol.

Purpose/Objectives: The purpose of this study was to develop an instrument that explored the beliefs of school nurses related to concussions, school policies related to communication about concussions, and factors were needed for nurses to feel supported and ready to manage cognitive rest/ return-to-classroom protocols.

Research Questions: What do school nurses believe about concussion symptoms, concussion consequences, concussion management, and cognitive rest protocols for return-to-classroom management? What are present concussion management policies, particularly related to the role of the school nurse? What are the perceptions of school nurses related to factors that control the behavior of school nurses in concussion management? Is the Schneider Concussion Care Survey a psychometrically sound instrument for measuring the domains of the planned behavior of school nurses in concussion management protocols?

Methods: The methodological design for this study was a cross-sectional descriptive survey, which was used to test the psychometric properties of the Schneider Concussion Care Survey. The survey was based on the domains of the Theory of Planned Behavior and used Qualtrics®. The convenience sample was comprised of Texas high school nurses, who were recruited through a link sent in a newsletter electronically distributed to members of the Texas Association of School Nurses.

Analyses: Descriptive statistics was used to analyze demographic and job characteristics of the school nurse participants. The psychometric properties of the instrument was assessed through exploratory factor analysis with orthogonal rotation. The reliability of the instrument and any resulting sub-scales were assessed for internal consistency reliability using Cronbach's alpha.

Keywords: concussion, school nurse, cognitive rest, adolescents, Theory of Planned Behavior

The Role of School Nurses in Concussion Management: An Exploratory Study

Between 1997 and 2012, the rate of concussions in student athletes between the ages of 8 and 13 doubled. In students between the ages of 14 and 19 years, the rate rose 200% (Moser, Glatts, & Schatz, 2012). The acute pathophysiological changes following a concussive injury last approximately seven to ten days. However, recent research indicates that 36% of athletes continue to have decreased cerebral blood flow for at least one month (Moser et al., 2012). During the month after a concussion, students demonstrated increased problems with concentration, problems remembering or learning new things, irritability, impulsive behavior, inability to deal with stress, difficulty organizing tasks, and fatigue that worsened with schoolwork (Sarmiento, Mitchko, Klein, & Wong, 2010). Other researchers found that concussed students also demonstrated decreased academic performance, impaired social function, slower reaction times, and higher rates of clinical depression (Kontos, Covassin, Elbin, & Parker, 2012). Neurologists recommend total brain rest for concussed students during the recovery period. Rest is defined as increasing hours of sleep needed, refraining from attending school, avoiding homework or reading, and not using computers or video games (Moser et al., 2012). Salinas and Webbe (2012) suggested that recovering athletes required special accommodations to insure adequate brain rest and exemption from schoolwork.

During the early 2000's the rates and long-term effects of concussions in student athletes came to the attention of federal agencies. Consequently, the Center for Disease Control and Prevention (2007) published a report and launched a program to draw attention to the problem of concussions in student athletes. The program had several goals. First, it provided videos and handouts that taught coaches and trainers to identify

symptoms found in the acute phase of concussions. Secondly, it warned all stakeholders of the dangers of returning to play prematurely. Finally, the report introduced the concept of second impact syndrome and guidelines for brain rest. Sarmiento et al. (2010) found that athletes and their parents pushed for premature return to play and were the greatest barriers in providing appropriate brain rest. The authors reported the parents did not understand the level of danger that premature return to play provided. Furthermore, students were very competitive and did not want to lose their position on the team or disappoint their teammates. Lastly, researchers found that the coaches did not receive support from school administrators, faculty, or school nurses in overcoming the barriers presented by parents or students (Sarmiento et al., 2010).

The purpose of this study was to develop an instrument that explored the knowledge of school nurses related to concussions, school policies related to communication about concussions, and what factors were needed for nurses to feel supported and ready to manage cognitive rest/ return-to-classroom protocols.

Theoretical Model

The Theory of Planned Behavior, developed by Azjen (2006), provides a framework for understanding human behavior. The model posits that behavior or intention to perform the behavior can be predicted by the person's attitudes, subjective norms, and perceived behavioral control over the action. Azjen further suggested that each of the model concepts were related and contributed to the eventual intention to perform the behavior (Ajzen, 2006).

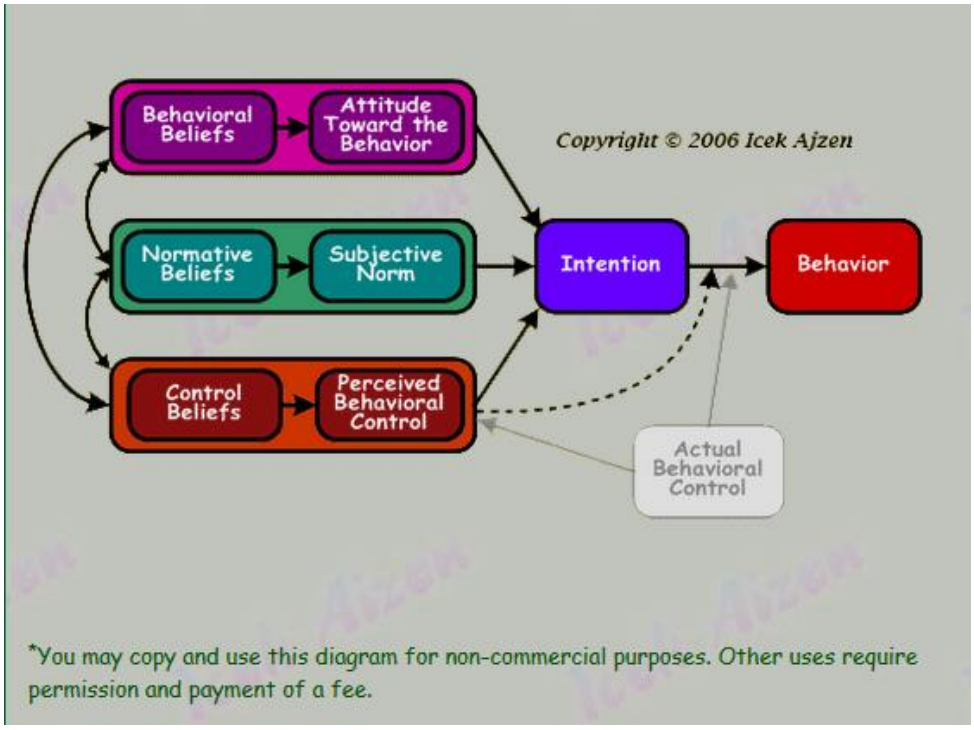

Figure 3.1. Theory of Planned Behavior (Azjen, I., 2006)

The concepts of the Theory of Planned Behavior provided the structure for the creation of an instrument to measure the school nurse's intention to implement or adhere to guidelines for the care of a student returning to school after a concussion. Under the domain related to attitudes, the survey presented questions related to the school nurse's beliefs about the consequences of concussions and their judgements related to management protocols. Additionally, another dimension under the domain related to attitude included questions related to the school nurse's beliefs about the efficacy of cognitive rest in return-to-classroom management. The domain of subjective norms had two dimensions. The first dimension included questions related to current school policies for concussion management. The second dimension included questions related to the present role of school nurses in concussion management and the school nurse's perceptions of protocols in relation to the American Association of School Nurses

position statement about the role of school nurses in concussion management. The third domain, related to perceived behavioral control, explored the school nurse's perceptions about factors related to behavior, such as student and parent beliefs, support of faculty and administration, and work environment.

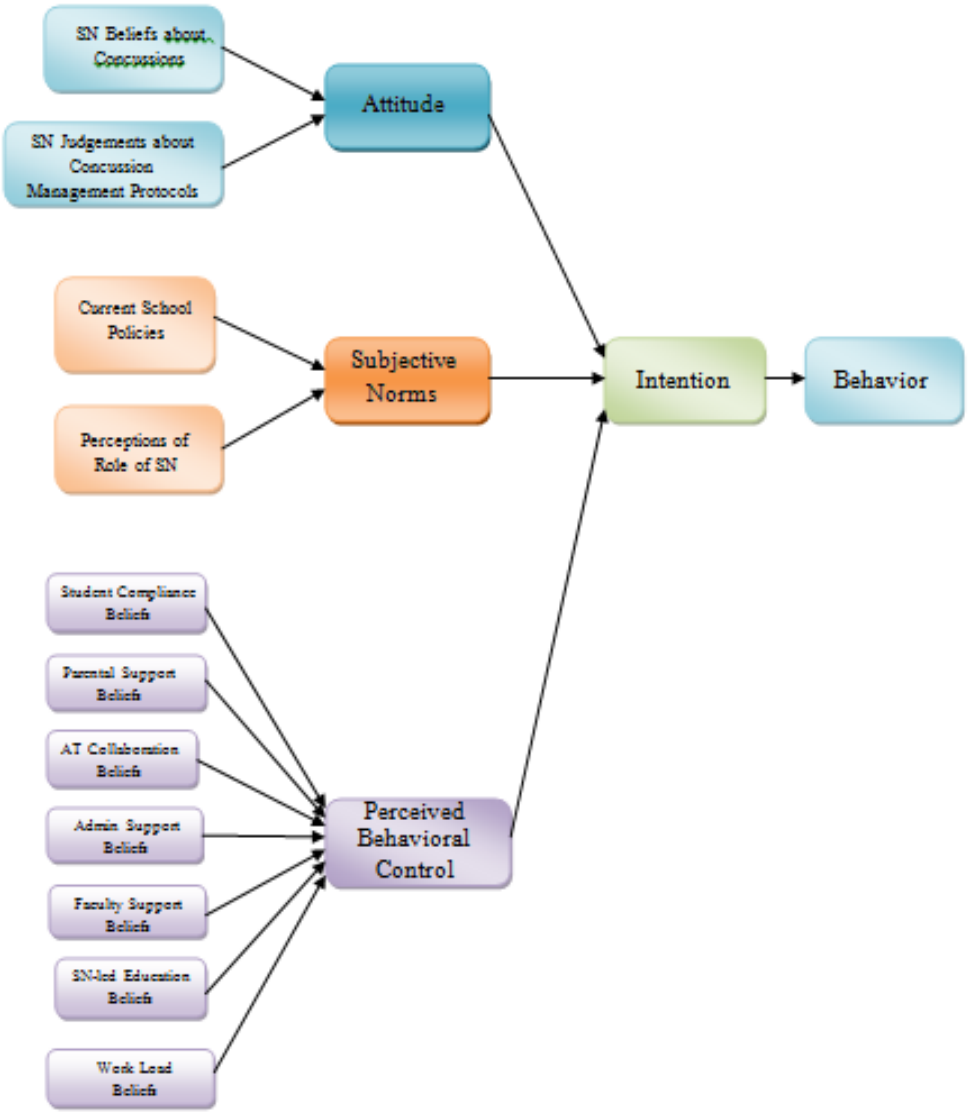

Figure 3.2. The Theory of Planned Behavior adapted to pilot study (Adapted from Azjen, I., 2006)

Review of Literature

In order to capture the critical domains pertinent to the development of this instrument, the literature was organized around the basic theoretical concepts of the Theory of Planned Behavior (Ajzen, 2006). Each concept was examined from the purview of the school nurse and the school nurse's role in the care and treatment of students with concussions.

As many as 300,000 athletic concussions occur each year (Halstead et al., 2013). Neil et al. (2012) estimated that the costs incurred directly and indirectly from concussions exceeds $60 billion in the United States each year. Additionally, over the past decade, the rate of concussion-related visits to the emergency room increased by 70% and the rate of concussions that were related to sports rose 57% in those below the age of nineteen (Centers for Disease Control and Prevention, 2014). Whereas, Lincoln et al. (2011) reported that increased rates of concussions may be due to heightened awareness and improved coding, Karr et al. (2014) suggested rates are probably much higher due to underreporting.

With an estimated 44 million children involved in organized sports in the United States, Neal et al. (2012) reported that sports related concussions might be as high as 3.8 million annually. Of the 200,000 athletes treated annually for concussions, 65% are between the ages of five and eighteen years. Due to the relative size of the head compared to the rest of the body, brain water content, degree of myelination, shape of the head, and decreased neck strength, an impact delivers more force to the brain of a child than in older counterparts, which partially explains higher levels of concussions in the young (Neil et al., 2012).

Attitude

Beliefs about the consequences of concussions. A review of literature did not provide any studies that focused on the beliefs of school nurses related to concussion symptoms. Only one study addressed the beliefs of emergency department nurses related to concussion symptoms and consequences. Bay (2011) reported that the nurses surveyed did not associate many common symptoms or consequences with concussions. Chrisman et al. (2014) reported that coaches recognized common concussion symptoms and believed that the consequences were significant. The researchers attributed these beliefs to the passage of the Lystedt Concussion Law in 2009, which mandated concussion training for coaches, players, and athletic trainers. The Lystedt Law did not address any training for school nurses (Washington Traumatic Brain Injury Strategic Partnership Advisory Council, 2013). White et al. (2014) found that athletic trainers had a higher level of concern about the symptoms and consequences related to concussions than coaches did, but did not address the beliefs of school nurses.

Judgements about management protocols. Weber, Welch, Parsons, and McLeod (2015) conducted a study that examined school nurses' perceptions and beliefs about cognitive rest protocols in concussed students. They reported that most school nurses were familiar with academic accommodations and cognitive rest for concussed athletes; however, only 28.5% felt that this was a needed intervention (Weber, Welch, Parsons, & McLeod, 2015). Similarly, Williams and colleagues (2015) reported that most high school athletic trainers were familiar with academic accommodations, but only 41% of concussed student athletes managed by athletic trainers received accommodations.

Subjective Norms

Current school concussion management policies. The literature abounded with reviews and research related to sideline diagnosis of concussions and recommendations for return-to-play decisions. According to The American Medical Society for Sports Medicine 2012 Position Statement, sideline concussion diagnosis and return-to-play decisions should be made by a licensed healthcare provider trained in the evaluation and management of concussions (Harmon et al., 2013). According to a study by Bell et al. (2005), 73% percent of Illinois high schools had an athletic trainer and 43% schools had a physician responsible for medical care. Availability of the medical care providers differed between practice and games, however only 16% of schools reported no provider available during games. Similarly, Pryor et al. (2015) reported that 70% of secondary schools provided athletic trainers at sports games or practices. A review of literature did not yield any articles that directly reported the role of school nurses in the acute management of concussed athletes.

Multiple studies addressed concussion communication protocols. For example, McGrath (2010) suggested that after diagnosing a concussion, athletic trainers should send an email to key members of the school staff, including the school nurse, guidance counselor, teachers, and parents providing pertinent details about the injury, and reminding the staff that the student may temporarily need assistance with managing symptoms and academic demands. What was not found in a review of literature was the degree of compliance with these recommendations or the role school nurses play in the management of acute concussion symptoms.

Recommended role of school nurses in concussion management. In 2012, the National Association of School Nurses (NASN) issued a position statement that directed school nurses to become active members of the team that assisted concussed students returning to school. The NASN statement further emphasized the role of school nurses as facilitators of the academic team (Diaz & Wyckoff, 2013). According to Hossler et al. (2014), concussions are best managed by a team that includes the student, family, health care providers, school staff, coaches, and athletic trainers. The school nurse should educate school faculty, counselors, and administrators about the symptoms and management of concussions, as well as the ramifications of premature activities (McLeod, 2014). School nurses should direct the campus in developing an emergency action plan, a concussion management plan, and a management team (McLeod, 2014).

Students may require accommodations upon return to school. The school nurse may need to facilitate these accommodations and guide teachers in the use of the protocol guidelines related to coursework and class attendance (Halstead et al., 2013).

The school nurse, as the resident health care provider on a school campus, is in an ideal position to facilitate communication with parents. Additionally, the nurse can provide education and support for the family related to concussion symptoms and management. Information provided by the parents can allow the nurse to continuously update the student's progress and revise the management program (Diaz & Wyckoff, 2013).

When a student has persistent concussion symptoms, the school nurse should seek a referral to a concussion management clinic, neuropsychologists, or a neurologist. Last,

when the student is experiencing cervicogenic vertigo, the school nurse may suggest a visit to a physiotherapist or physical therapist (Reneker & Cook, 2015).

Perception of compliance with American Association of School Nurses Position Statement. Weber et al. (2014) reported that the majority of school nurses they surveyed were familiar with academic accommodations. The researchers reported that 59.4% of concussed student athletes received academic accommodations; however, only 40% of the school nurses recommended academic accommodations after concussive injuries (Weber et al., 2014).

Intention to comply. There were no studies in the literature that directly addressed the intentions of school nurses related to concussion management, Weber et al. (2014) did report the findings of several key questions that contributed to intention according the Theory of Planned Behavior. First, 76.7% of the school nurses in the study felt that they have the ability to assist with a concussed student's return-to-classroom. Second, 79.7% agreed that concussions have the potential to affect classroom performance. Third, 71% felt that concussed athletes were eligible to receive academic accommodations under the guidelines presented by the American with Disabilities Act (Weber et al., 2014).

Perceived Behavioral Control

Beliefs on student compliance and parental support. There were no studies found in the literature that directly addressed the school nurses' perceptions of student athletes' or their parent's compliance with concussion management protocols. Glang et al. (2015) reported that a web-based educational model improved student and parental compliance with concussion management protocols. Similarly, Davies and Bird (2015)

reported that college athletes who were unfamiliar with the severity of concussion sequelae were less likely to report symptoms after their injuries. Kroshus et al. (2015) reported that concussed athletes in four colleges were less likely to report concussion symptoms when they felt pressured by coaches, teammates, and parents to play. There were no studies found that addressed these issues in adolescent samples. However, two studies by Sandel et al. (2013 and 2015), indicated that concussed student athletes are most likely to report somatic symptoms when reporting their recovery status. These symptoms did not correlate well with cognitive or neuropsychiatric/ sleep symptoms, and were therefore deemed unreliable. Sandel et al. (2015) also reported that parents most often focused on somatic symptoms as well. Despite claims made by many authors in contemporary literature that the culture of sports decreased accurate concussion reporting among athletes and their parents, there were no studies found in the literature that supported those claims. While, these studies suggest influences on concussed student behavior, no studies were found that reported school nurses' perceptions of student and parent behaviors that would influence their own attitudes towards behavioral control.

Beliefs on administration and faculty support. Heyer et al. (2015) found that high school principals who had concussion training within the last year were more likely to provide support for training of other faculty members and provide short-term academic accommodations for concussed athletes. However, only 32% provided parents with a written academic plan following a concussion (Heyer et al., 2015). McGrath (2010) recommended a full team that included school counselors, school psychologists, and school social workers (in addition to school nurses, athletic trainers, and teachers) were needed to implement academic accommodations for students who had experienced

concussions. A review of the literature provided no articles that addressed the present role or attitudes of key administrators or faculty members. There were also no studies that addressed the influence of other faculty on perceptions of behavioral control in school nurses.

Beliefs on ability to work collaboratively with athletic staff. Despite a study by Rains et al. (2010) that reported athletic trainers and nurses had improved concussion management programs when they collaborated, the literature lacked any articles that reported the incidence of such collaboration in American high schools.

Beliefs on ability to fit actions into present work load. Weber et al. (2015) posited that school nurses who are assigned to multiple schools may not realistically be expected to play a major role in concussion management. However, there were no studies found in the literature that addressed this supposition.

Gaps in the Literature

Whereas, there were many studies found in the literature that reported findings on symptoms of concussions or return-to-play decisions, there were few studies related to return-to-classroom protocols or the role of school nurses in concussion management. Carson et al. (2014) performed a chart review of 159 sports related concussed patients. They found that 43.5% of the patients returned to play prematurely and 44.7% returned to school prematurely (Carson et al., 2014). Wood (2015) reported that school nurses were more aware of the seriousness of concussions, however, there was a lack of literature that supported this statement. Further, more research is needed to determine the present role school nurses are assuming in concussion management. There was a lack of literature related to the knowledge and attitudes of school nurses related to cognitive rest and

return-to-classroom protocols. There was also a lack of information in the literature related to how the diagnosis of a concussion is communicated to parents, school nurses, or other members of the support team. Another gap discovered in the literature was how the behaviors or attitudes of athletes, parents, administrators, faculty members, or athletic staff may affect the perceived behavioral control of school nurses and how these factors may influence the actual behavior of school nurses in managing concussions. There is a need for studies that specify what school nurses need to provide the care directed by the National Association of School Nurses Position Statement. By addressing these gaps in the literature, the researcher hopes to identify what school nurses need to be able to implement return-to-classroom protocols for concussed students and thereby improve concussion outcomes.

Research Questions

This exploratory study posed several research questions. The first question was, "What do school nurses believe about concussion symptoms, concussion management, and cognitive rest protocols for return-to-classroom management?" The second question asked, "What are present concussion management policies, particularly related to the role of the school nurse?" The third research question was, "What are the perceptions of school nurses related to factors that control the behavior of school nurses in concussion management?" The final research question was, "Is the Schneider Concussion Care Survey a psychometrically sound instrument for measuring the domains of the planned behavior of school nurses in concussion management protocols?"

Research Design

Because the literature lacks studies that directly examined the current practices of school nurses related to concussions in student athletes, it is important to clarify the protocols being used and school nurses' perceptions of these protocols initially. Presently, there is no instrument that addresses all of the research questions posed. Therefore, the methodological design chosen for this study was a descriptive survey that included the psychometric testing of an instrument developed to answer the research questions presented.

Protection of Human Subjects

Approval for the study was obtained from The University of Texas at Tyler Institutional Review Board (IRB). The purpose of the study, the risks and benefits of participation in the study, and plans for dissemination of the results were clearly stated. Informed consent was implied by the respondents' willingness to participate in the survey. Confidentiality of the participants and their responses was kept confidential using password protected encrypted electronic files and the use of Qualtrics survey tools, which provided blinded results. Participation in the survey was voluntary and participants were able to withdraw at any time. Contact information for the researcher was provided with the survey. Other than the possible discomfort that the participants might have experienced if they recognized they were not prepared to manage concussion protocols, there was little risk to the participants, making the survey eligible for expedited IRB approval. Participants were informed that the survey was designed to provide insight into developing interventions to enhance the ability of school nurses to manage return-to-classroom protocols for concussed high school athletes.

Methods

Sample

The survey was sent electronically to all members of the Texas Association of School Nurses, who comprised the accessible population. The sample consisted of all high school and middle school nurses who completed the survey. Whereas, the sampling method was developed as convenience sampling, snowballing was used to increase the number of participants, with a goal of obtaining ten participants per survey question, as recommended by Polit and Beck (2011). Additionally, participants were offered the opportunity to enter a drawing for one of three $25 Amazon gift certificates upon completion of the survey. Because the survey was distributed via a link embedded within an electronic newsletter, it was possible only to track the number of views the newsletter received. Initially the newsletter received 302 views, with 82 responses to the survey. A second distribution of the survey was redistributed yielded an additional 159 views, however only six more participants responded. Because of the small number of respondents and multiple unanswered questions, the questions in Qualtrics were edited to force responses in order to be able to proceed and snowballing was used. The final number of respondents was 176, with 100 completing all answers and 116 completing most answers.

Instrument

The instrument was composed of a Likert-scale format survey, with scores ranging from one to five. The instrument was divided into three subscale sections that corresponded to the three domains of the Theory of Planned Behavior. There was a total of 22 Likert-style questions, with seven or eight in each of the three domains. The

possible range of scores was 22-110. In addition to the Likert-style questions, the survey included three open-ended questions that were used to enhance the researcher's understanding of the results and to determine if additional questions were needed to improve the instrument.

Table 3.1 Theoretical Concepts in Survey

Defined	Dimensions	Survey Questions	Level of Data
Attitude	Beliefs about consequences of concussions, judgements about concussion management protocols	8	Continuous
Subjective Norms	Current policies, role of SN	7 1	Continuous String
Perceived Behavioral Control	Beliefs: student compliance, parental support, principal support, faculty support, athletic collaboration, ability to balance work load	7 1	Continuous String

All portions of the instrument were submitted to a panel of experts to determine content validity. Content validity is concerned with how well an instrument captures all aspects of the concepts that it is intended to measure and is determined in a two-step process. During the first stage, the researcher established the domains of the instrument, created the questions under each domain, and assembled the questions into a usable form. During the second stage, a panel of four experts reviewed the instrument, item by item, looking for relevance to each of the domains. The experts rated each question using a four-point scale as "not relevant", "in need of significant revision", "in need of minor revision", or "very relevant". This process determined an index of the content validity

(CVI). A rating of three or four was needed on each item to indicate content validity. The experts also identified any areas omitted by the tool and evaluated each question for clarity. The experts determined that all questions were relevant and minor changes were made to enhance the clarity of three questions (Lynn, 1986). Three of the experts recruited for review of the instrument were former school nurses and are presently professors of nursing, one in graduate school and two in undergraduate programs. The fourth expert is a professor of kinesiology, and coauthor of another article that employed the Theory of Planned Behavior to assess the beliefs of athletic trainers in concussion management (Rigby et al., 2013). The revised instrument was formatted into a Qualtrics electronic survey for distribution. Internal consistency reliability was derived with Cronbach's Alpha, using 0.7 as an acceptable threshold score (Portney & Watkins, 2009).

Statistical Analysis

The results from Qualtrics were imported to Statistical Package for the Social Sciences (SPSS) Version 23 (International Business Machines Corporation, 2015) for statistical analysis. The survey numerical scores were totaled and treated as interval-level data for statistical analysis. Descriptive statistics were used to identify sample characteristics and to identify subscale scores, means, and standard deviations. Individual factors were identified with exploratory factor analysis with orthogonal rotation. Factor analysis is an appropriate test when the study is exploratory in nature and the goal is to develop an instrument and determine the underlying dimensions that exist within the set of variables (Portney & Watson, 2009). Additionally, since the sample size was limited, Kaiser-Meyer-Olkin (KMO) statistics was performed. KMO predicts if data are likely to factor well, based on correlation and partial correlation. KMO scores range

from 0 to 1.0 and the total KMO should be .60 or higher to proceed with factor analysis (Laerd Statistics, 2015). Finally, crosstabs were run to determine if there was significant correlation between key demographic factors and survey responses.

Results

Demographics

The sample studied had similar demographic characteristics to a national survey of school nurses conducted by Deacy and Morrison (2015), which supported the external validity of the pilot study. In the pilot study, 61.2 of the respondents reported that they had a bachelor's degree in nursing (BSN), with 58.3% of school nurses reporting they had a BSN the national survey.

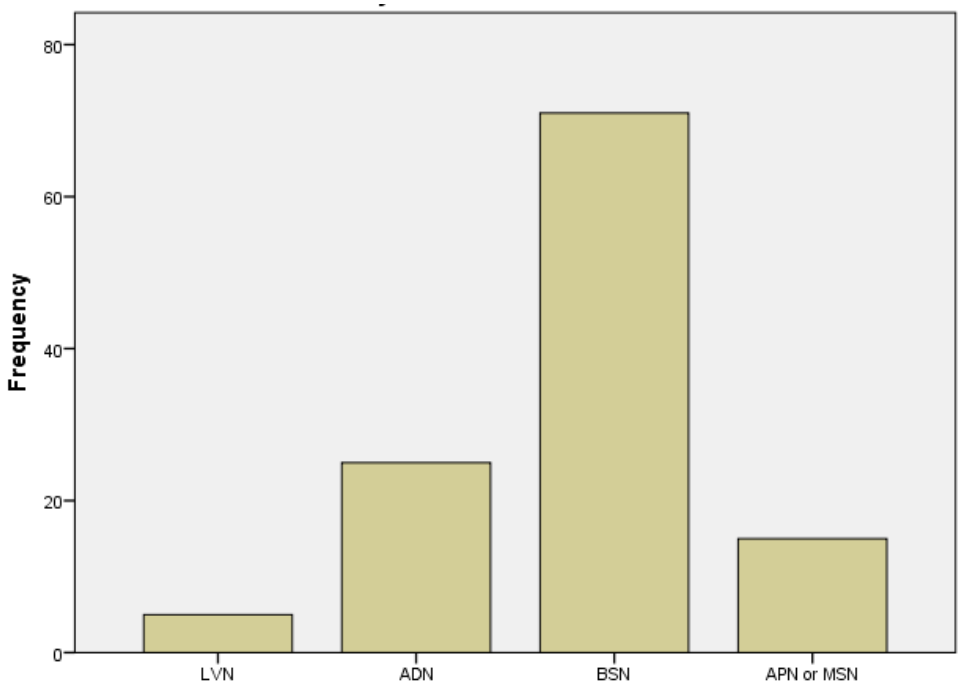

Figure 3.3. Level of education of school nurses

In both studies, the majority of school nurse participants were employed at public schools as opposed to private schools (95.7% in pilot and 93.1% in the national study). Similarly, the two studies reported similar demographics for school geography. The pilot study

included 24.6% urban schools, 62.7% suburban schools, and 12.7% rural schools. The national study reported 21.5% urban schools, 50.1% suburban schools, and 28.3% rural schools. The participants in the two studies had comparable mean years of experience as school nurses: (*M* =10.4, *SD* = 8.2) in the pilot study and (*M* = 12.1, *SD* = 7.6) in the national study. Finally, in the pilot study it was determined that 82.2% school nurses had formal training in concussion management while employed as a school nurse.

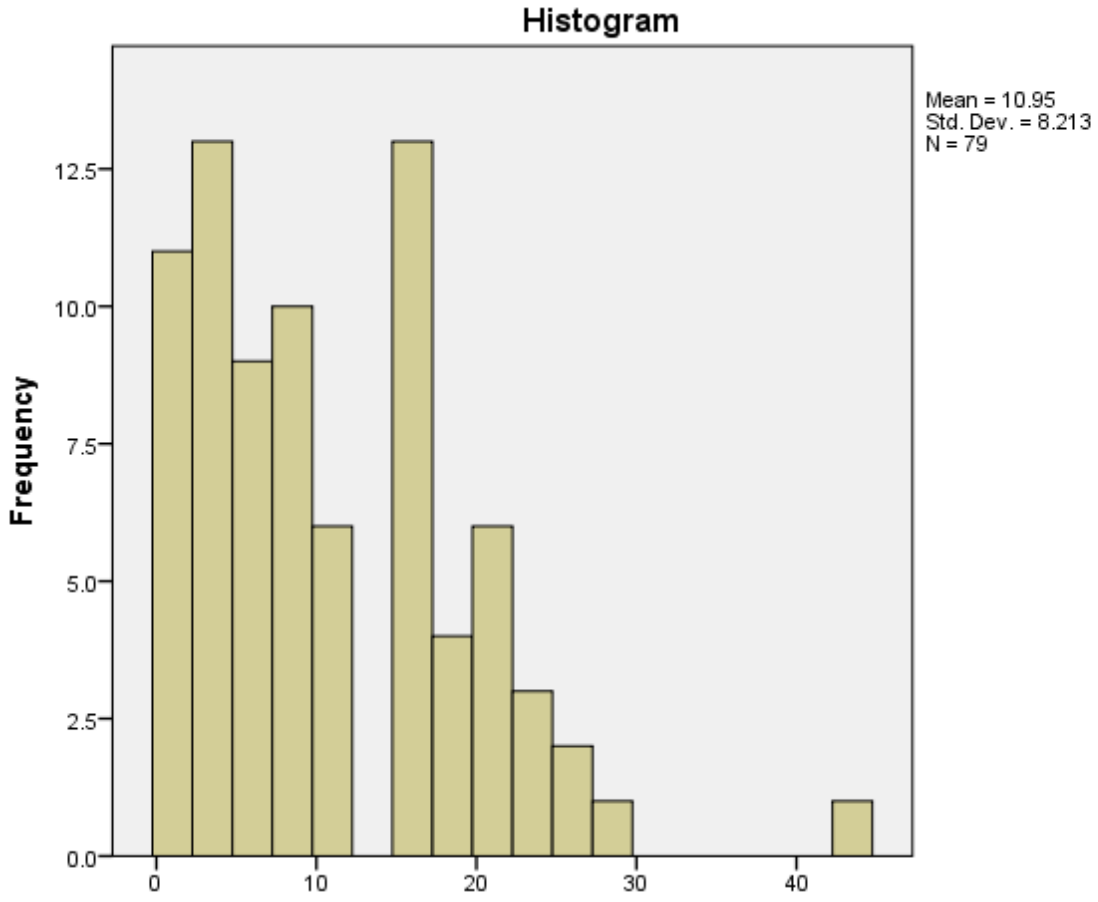

Figure 3.4. Years of experience as a school nurse

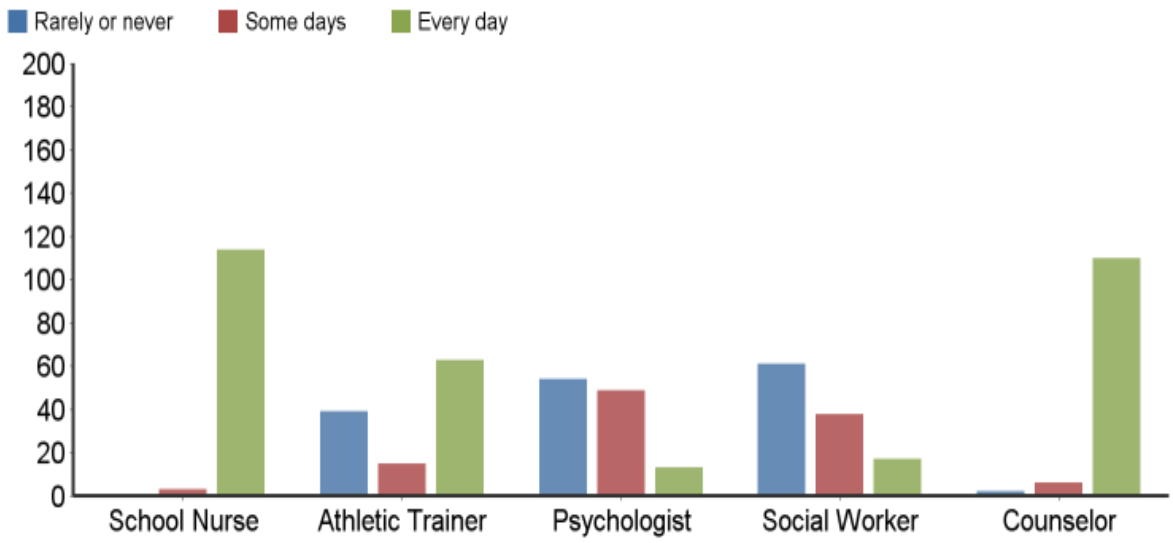

Figure 3.5. Frequency of presence of middle school and high school personnel

Subjective Norms

The seven questions in the survey that reported subjective norms examined current policies related to concussions and the present role of school nurses in concussion protocols. It was interesting to note that the school personnel who were on campus most frequently were the school nurses (96.6% reported that a school nurse was present every day). Only 53.8% reported that athletic trainers were present every day, and yet 66.1% reported that athletic trainers diagnosed concussions in students. Additionally, only 31.4% reported that school nurses were routinely informed and 43.2% were usually informed when a student sustained a concussion.

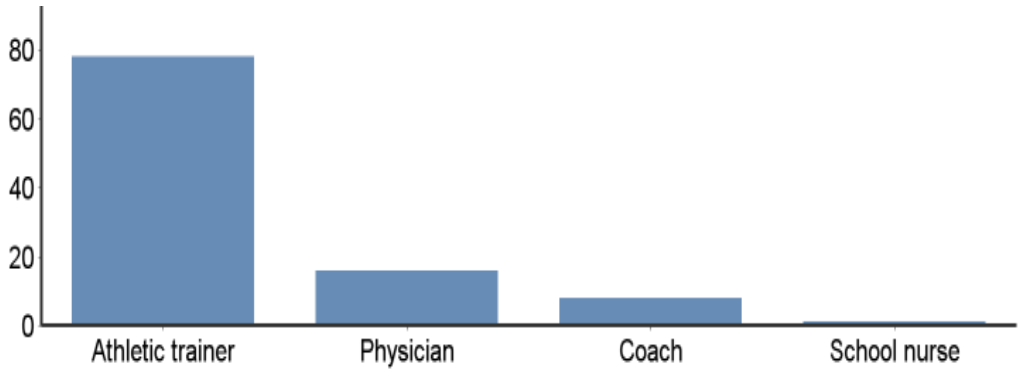

Figure 3.6. Frequency of concussion diagnosis by personnel

Despite strong recommendations from the CDC and the Lystedt law, only 65.8% reported that a health care provider routinely made the decision for return-to-play. Only 32.5% reported that their school routinely had a formal plan for cognitive rest and 33.3% reported that their school had a formal plan for transitional return-to-classroom. Merely

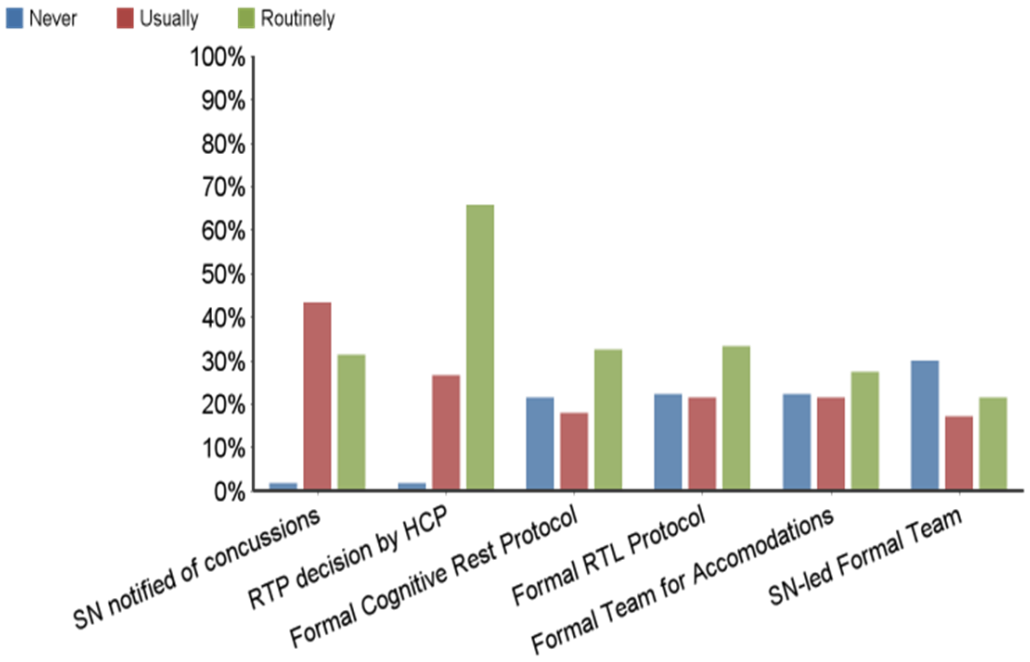

Figure 3.7. Current school policies for concussion management.

27.4% reported that their school routinely had a team to determine academic accommodations for concussed students and only 21.4% had teams to determine academic accommodations that included school nurses.

Attitudes

Eight questions explored the attitudes of school nurses related to concussion protocols and their comfort in assessing common symptoms in concussed students. Among school nurses within the study, 93.2% agreed or strongly agreed that concussions have a significant effect on a concussed student's ability to perform academically. Similarly, 91.5% reported that they agreed or strongly agreed that cognitive rest is important in order to recover from a concussion. A lower number, 85.6%, agreed or strongly agreed that a gradual return-to-classroom protocol is important in order to recover from a concussion. However, 89% reported that they agreed or strongly agreed that students who suffered a concussion qualified for academic accommodations during their recovery from a concussion. Interestingly, only 76.3% of the school nurses surveyed agreed or strongly agreed that school nurses should coordinate the team that manages a student's return to classroom while recovering from a concussion.

Perceived Behavioral Control

The seven questions under the domain of perceived behavioral control examined perceptions that nurses had related to the amount of support anticipated by each of the six stakeholders affected by cognitive rest and return-to-classroom protocols. Additionally, one question explored the nurses' perceptions on how much their current workload might interfere with assuming management of the proposed protocols. Nurses perceived concussed athletes more supportive of cognitve rest/ gradual return-to-classroom

protocols (70.1%) than parents (64.9%). Among school personnel, school nurses anticipated more support from their principal (87.2%), followed by teachers (79.6%), then coaches (71.9%), and finally by athletic trainers (66%). Lastly, it was important to note that only 68.3% felt confident that their present work load would allow them to manage cognitive rest/gradual return-to-classroom protocols.

Table 3 2. School Nurses' Confidence in Support for Cognitive Rest/ Transitional Return-to-classroom Protocol by Individuals

		Concussed Athlete	Athlete's Parents	Principal	Teachers
N	Valid	117	117	117	118
	Missing	59	59	59	58
Mean		3.83	3.78	4.32	4.11
Median		4.00	4.00	4.00	4.00
Skewness		-.876	-.334	-.964	-.731
Std. Error of Skewness		.224	.224	.224	.223
Kurtosis		.136	-.616	.558	-.023
Std. Error of Kurtosis		.444	.444	.444	.442
Percent supportive		70.1	64.9	87.2	79.6

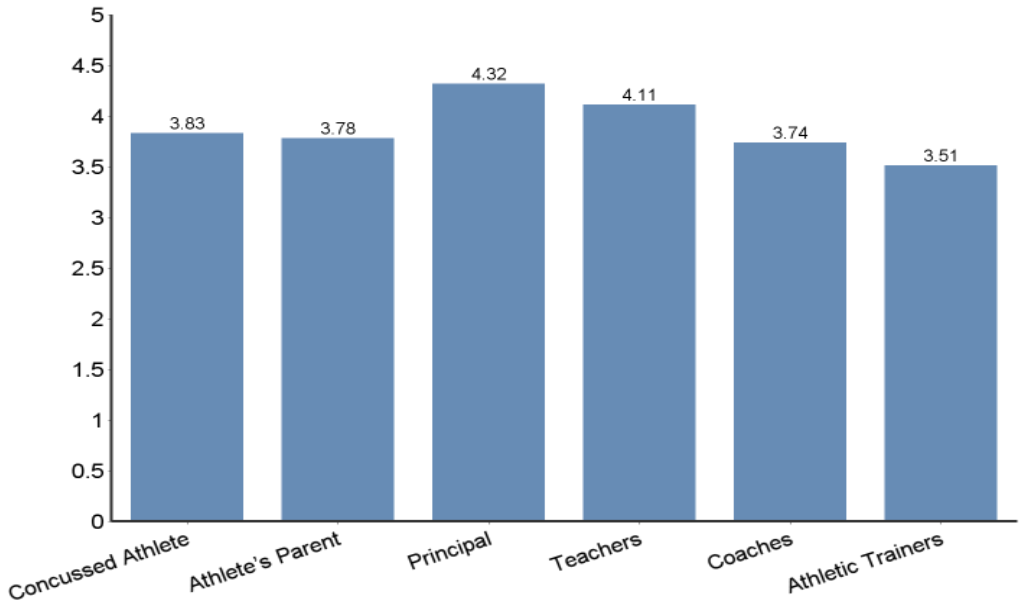

Figure 3.8. Frequency of presence of middle school and high school personnel

Factor Analysis

Principal Component Analysis (PCA) was utilized to extract factors (See Table 9). The total Kaiser-Meyer-Olkin (KMO) should be .60 or higher to proceed with factor analysis. The KMO for the Schneider Concussion Care Survey was .80 and Bartlett's Test of Sphericity was significant ($p < .0001$), which indicated sample adequacy (Field, 2013). The results of the parallel analysis suggested retaining five factors. The retained factors included protocol beliefs, perceived behavioral control: family and staff, subjective norms, comfort with symptoms, and perceived behavioral control: athletics. The two factors that will be dropped from the instrument for future use, included one question that inquired about the frequency of health care providers making return-to-play-decisions and another question that explored how frequently school nurses were notified of students sustaining concussions. Since the latter question is essential, but may not be effected by an intervention, it will be moved to the demographic section in the

future. Because this study was exploratory in nature, the data from these questions was retained to enhance the researcher's understanding of the material. The scale had a high level of internal consistency, supported by the Cronbach's alpha ($\alpha = 0.851$).

Table 3.3. Factor Analysis of Schneider Concussion Care Survey

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Please rate your level of agreement for each of the statements below:-Cognitive rest is important for a student's recovery from a concussion.	**.914**	.099	-.001	.068	.046
Please rate your level of agreement for each of the statements below:-Gradual return-to-the classroom is important for a student's recovery from a concussion.	**.899**	.091	.046	-.021	.020
Please rate your level of agreement for each of the statements below:-Concussed students qualify for academic accommodations during their recovery.	**.891**	.097	.039	.080	.058
Please rate your level of agreement for each of the statements below:-Concussions have a significant effect on a student's ability to perform academically.	**.863**	.076	-.090	.054	-.021
Please rate your level of agreement for each of the statements below:-School nurses should coordinate a team effort for a student's cognitive rest/ the transition back to the classroom protocol.	**.674**	.061	-.022	.211	.297
Please rate how confident you are with each of the following:-A concussed athlete's parent(s) would support a cognitive rest/ transitional return-to-classroom protocol?	.092	**.870**	.034	.063	.013
Please rate how confident you are with each of the following:-The teachers at your school would support a cognitive rest/ transitional return-to-classroom protocol?	.089	**.770**	.096	.092	.375
Please rate how confident you are with each of the following:-A concussed athlete would follow a cognitive rest/ transitional return-to-classroom protocol?	.109	**.730**	.385	.126	.106
Please rate how confident you are with each of the following:-Your principal(s) would support a cognitive rest/ transitional return-to-classroom protocol	.154	**.723**	.205	.170	.261
Please rate how frequently each of these occur at your school:-Our school has a formal plan for cognitive rest to classroom protocol.	.004	.094	**.948**	.017	.114
Please rate how frequently each of these occur at your school:-Our school has a formal plan for a gradual return-to-classroom protocol.	-.027	.145	**.938**	.030	.080
Please rate how frequently each of these occur at your school:-There is a formal team who makes academic accommodations for concussed students.	-.026	.217	**.809**	.005	.153
How comfortable are you in assessing the physical symptoms of a concussion?	.047	.129	.041	**.920**	.075
How comfortable are you in assessing the cognitive or affective symptoms of a concussion?	.058	.090	-.018	**.896**	.022
How willing are you to participate in the management of concussions?	.225	.168	.007	**.723**	.209
Please rate how confident you are with each of the following:-The athletic trainers at your school would support a school nurse led cognitive rest/ transitional return-to-classroom protocol?	.006	.065	.184	.021	**.838**
Please rate how confident you are with each of the following:-The coaches at your school would support a school nurse led cognitive rest/ transitional return-to-classroom protocol?	.097	.285	.052	.175	**.811**
Please rate how confident you are with each of the following:-Your workload would allow you to lead a cognitive rest/ transitional return-to-classroom protocol?	.236	.339	.056	.071	**.710**
Please rate how frequently each of these occur at your school:-When a student has been diagnosed with a concussion, the return-to-play decision is made by a health care provider.	-.004	-.033	.172	.288	**.312**
Please rate how frequently each of these occur at your school:-When a student is diagnosed with a concussion, the school nurse is notified.	.020	.256	.294	.236	**.298**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Table 3.4. Internal Consistency for Factorially Derived Subscales and Total Scale of the SCCS.

Factor	Attitude: Protocol	PBC: family & staff	Subjective Norms	Attitude: Comfort Sx	PBC: athletics	Total
Cronbach's Alpha	.905	.847	.918	.857	.816	.851

Strengths and Limitations

The participants who respond to the survey may not represent the target population. Respondents may have more interest in the subject, providing different responses than those who have less interest and did not respond. Additionally, respondents are members of the Texas School Nurse Association, and are therefore, more familiar with topics publicized by the organization, including concussions. The demographic data correlates closely with the demographic data reported in a national survey of school nurses, which added support to the sample being representative to the target population. The most significant limitation, however, is the small sample size in this study. Further, the Theory of Planned Behavior and the operational definitions of the constructs used may not capture the factors that influence the school nurse's intent, which is a threat to construct validity. Threats to construct validity are best addressed through factor analysis (Portney & Watkins, 2009). Despite the small sample size, the results of the factor analysis and Cronbach's alpha supported the validity and reliability of the study. Finally, although Texas is a large state, with diverse demographics and a large number of school nurses, the culture of sports may have a stronger effect on the decision-making processes in concussion management. Therefore, the results of this pilot study may not be generalizable to other states.

Discussion

The study addressed the inconsistencies and gaps in current post-concussion literature related to the role of school nurses, reporting current norms and deficiencies within the protocols. The school nurse is in an ideal position to coordinate efforts to protect and care for students within the school setting. Additionally, nurses are natural patient advocates who have the potential manage the complex, individualized accommodations needed for concussed athletes as they transition back into the academic setting. The study identified several areas of concern in the school nurse's environment that warrant further exploration. There was a great deal of inconsistency in the communication provided to school nurses related to concussed students. Athletic trainers were reported to most frequently identify concussions in students and most often manage the return-to-play progression. It is important to identify the difference between the return-to-play protocol and the return-to-classroom protocol. As separate protocols with divergent settings and criteria, they are best managed by individuals with expertise in corresponding areas. The majority of school nurses in this study reported that the return-to-play protocol was being managed successfully by athletic trainers. However, the return-to-classroom protocol was reported to be ignored or managed consistently in the majority of cases. In the few cases where the entire protocol was being managed well, there was good communication and cooperation between the athletic staff, school nurses, and academic personnel. Additionally, these schools have well defined protocols with specific guidelines or flowsheets. Further research is needed to determine the efficacy of interventions that aim to improve communication among all stakeholders. Another area that warrants further research involves the development of standardized guidelines to

provide guidance to school nurses who do not have these tools provided by their districts. Although the sample size of this study did not confirm the psychometric soundness of the Schneider Concussion Care Survey, the data provided did support the reliability of the instrument and it may prove to be a valuable tool in future research. Despite the prominent role concussions play in the press and the progress being made in concussion recognition, there is still a great deal of work to be done to improve outcomes in our youth and to provide evidence-based protocols for school nurses to use in helping our students successfully return to academics.

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Chapter 4

Effects of a Scripted Online Video on School Nurse Perceptions of Concussion Management

Abstract

Problem: The rate of concussions in adolescents has risen 200% over the last decade. Concussed students have increased academic and emotional problems. Neurologists recommend total brain rest for these concussed students during the recovery period, followed by a transitional return-to-classroom protocol.

Theory: The Decomposed (Modified) Theory of Planned Behavior offers a framework that allows for examination of variables that affect the perceptions and intentions of school nurses related to management of cognitive rest/return-to-classroom protocols for concussed students.

Hypotheses:

H_1 = The Interventional Group receiving a SOV will demonstrate significantly higher changes in behavior scores than the Attention Control Group receiving a Power Point over time.

H_2 = The Interventional Group will demonstrate significantly higher changes in self-efficacy scores than the Attention Control Group.

H_3 = The Interventional Group will demonstrate significantly higher changes in attitude scores than the Attention Control Group.

H_4 = The Interventional Group will demonstrate significantly higher changes in

perceived behavioral control scores than the Attention Control Group.

H_5 = The Interventional Group will demonstrate significantly higher changes in intention scores than the Attention Control Group.

In addition to the hypotheses, the following research question was asked: What are the relationships among major studied constructs (attitude, self-efficacy, resource beliefs, and perceived behavioral controls, intent) and behavior change?

Design: An experimental, pretest-posttest research design

Methods: Convenience sampling of middle school and high school nurses with randomized assignment to control and study groups was used for this study. The Schneider Concussion Care Survey was used to measure variables before and after exposure to the intervention.

Analysis: Descriptive and inferential statistics were used to analyze the data. Multivariate analysis of variance (MANOVA) was performed to test the differences between methods of content delivery. The between groups effects of the intervention was examined with Chi Square tests. Pearson's Correlation was performed to examine the relationship of study variables, with the exception of behavior, which was examined with Spearman's rho.

Results: The MANOVA indicated that pretest to posttest changes did not achieve statistical significance for the Attitude scale, $F(1,112) = 1.37$, $p=.24$ and for the Perceived Behavioral Control scale, $F(1,112) =.10$, $p=.75$. Similarly, there were no statistically significant changes in scores of the Self-Efficacy, $F(1,112) = 1.85$, $p=.36$, Beliefs About Resources, $F(1,112) = .02$, $p=.88$, or Intentions for Return-To-Classroom, $F(1,112) = .14$, $p=.71$ subscales. The Chi Square test was performed to determine the effect of the

intervention on the desired behavior and the results indicated that those who viewed the video were not more likely to have than those who viewed the power point, X^2 (2, 108) = .092, p = .762. A Pearson's Correlation indicated that pretest to posttest changes in intentions for return-to-classroom were significantly related at the moderate level to pretest to posttest changes in perceived behavioral control, r(114)=.44, p<.01, self-efficacy, r(114)=.33, p<.01, and beliefs about resources, r(114)=.29, p<.01, while attitude was unrelated at a significant level. A Spearman's rho analysis indicated that behavior was significantly related to self-efficacy (r = .23, r < 0.05), perceived behavioral control (r = .29, r < 0.01), resource beliefs (r = .26, r < 0.01), and intention (r = .33, r < 0.00). There was no significant correlation between behavior and attitude (r = .08, r = .39).

Keywords: concussion, school nurse, cognitive rest, return-to-learn, scripted video

Effects of a Scripted Online Video on School Nurse Perceptions of Concussion Management

Between 1997 and 2012, the rate of concussions in student athletes between the ages of 8 and 13 years doubled. In students between the ages of 14 and 19 years, the rate rose 200% (Moser et al., 2012). In the United States alone, the costs incurred directly and indirectly from concussions exceed $60 billion each year (Neal et al., 2012). The physical and cognitive price concussed athletes pay, however, is immeasurable.

A concussion results from a direct blow to the head or impulsive forces transmitted to the head (McCrory et al., 2013). The damage to the brain after a concussion is not structural, but functional. Immediately after the injury, the cells within the brain depolarize, releasing neurotransmitters that cause potassium to leave the cells and calcium to enter the cells, which can cause their death. In order to restore homeostasis, the brain requires increased glucose; however, the cerebral blood flow is decreased, resulting in an energy crisis. The metabolic disparity lasts about seven to ten days, and accounts for the symptoms concussed students experience (Erdtmann, 2015). However, recent research indicated that 36% of athletes continued to have decreased cerebral blood flow for at least one month (Moser et al., 2012). Furthermore, children between the ages of ten and nineteen, despite increased brain plasticity, displayed more severe symptoms after a concussion and take longer to recovery than adults (Ma et al., 2012). During the month after a concussion, students demonstrated increased problems with concentration, problems remembering or learning new things, irritability, impulsive behavior, inability to deal with stress, difficulty organizing tasks, and fatigue that worsened with schoolwork (Sarmiento et al., 2010). Additionally, concussed students

demonstrated decreased academic performance, impaired social function, slower reaction times, sleep disturbances, and higher rates of clinical depression (Kontos et al., 2012).

Neurologists recommend total brain rest for concussed students during the recovery period (McCrory et al., 2013). Cognitive rest is defined as increasing hours of sleep, refraining from attending school, avoiding homework or reading, and not using computers or video games (Moser et al., 2012). Salinas and Webbe (2012) suggested that recovering athletes required special accommodations to insure adequate brain rest and exemption from schoolwork.

During the early 2000's the rates and long-term effects of concussions in student athletes came to the attention of federal agencies. Consequently, the Centers for Disease Control and Prevention (2007) launched a program to draw attention to the problem of concussions in student athletes. The program had several goals. First, it provided videos and handouts that taught coaches and trainers to identify symptoms found in the acute phase of concussions. Secondly, it warned all stakeholders of the dangers of returning to play prematurely. Finally, it introduced the concept of second impact syndrome and guidelines for brain rest. Currently, all 50 states have passed laws that address guidelines for return-to-play in young athletes (Centers for Disease Control and Prevention, 2014).

There were many articles in the literature that provided guidelines for cognitive rest and return-to-classroom protocols, however, there was little consistency in the suggestions. Furthermore, the literature indicated that extended, strict cognitive rest programs or premature return-to-classroom protocols may exacerbate concussion symptoms (Baker, 2014). Many researchers suggested a protocol that included cognitive rest for approximately one week post injury with a gradual return-to-learning. One study

found that students who immediately returned to school took 100 days to recover, while those who engaged in a mild or moderate level of cognitive activity took 20-50 days to recover (Brown, 2014). Nevertheless, little research addressed the optimal protocol or provided evidence-based recommendations (Hall et al., 2015; Halstead et al., 2013). Moreover, it is difficult to assess the student's progress because the number of symptoms the student experiences initially does not correspond to the necessary recovery time. The student must also self-report symptoms and most school personnel are unfamiliar with the spectrum of symptoms attributed to concussions (Darling et al., 2014). Baker (2014) suggested, that no one protocol is appropriate for all students, and cognitive rest/return-to-learn guidelines should be individualized for students, based upon frequent reassessments of their symptoms.

In addition to the problems associated with students self-reporting symptoms, several other factors complicate concussion recognition and management. Sarmiento et al. (2010) found that athletes and their parents pushed for premature return- to-play and were the greatest barriers in providing appropriate brain rest. The authors reported the parents did not understand the level of danger that premature return-to-play provided. Furthermore, students were very competitive and did not want to lose their position on the team or disappoint their teammates. The researchers also determined that coaches did not receive support from school administrators, faculty, or school nurses in overcoming the barriers presented by parents or students. Therefore, it is not surprising that researchers approximated that 44.7% concussed students returned to school too soon (Carson et al., 2014).

Athletic trainers, who diagnosed most athletic concussions, did not always notify school nurses of injuries and rarely managed the academic portion of the protocol (Sleight, Valovich McLeod, Kay, Erickson, & Welch, 2015). Nurses possess the skill set that includes patient assessment and case management, and are well-suited to manage the student's case and return-to-classroom progress. School nurses frequently perform physical assessments that guide care and student activities in the school setting. They are familiar with prevention programs, faculty or parent education presentations, and academic accommodation processes. In 2012, the National Association of School Nurses issued a position statement that directed school nurses to become active members of a collaborative team that assisted concussed students in their transition to the classroom (Diaz & Wyckoff, 2013). A study in Canada, reported wide variability in the compliance of schools and school nurses in following national recommendations for cognitive rest (Olympia et al., 2015). However, there were no similar studies conducted in the United States, a country known for a strong sports culture and it is unclear why school nurses continue to have a small role or no role in concussion management when students return to school.

Theoretical Framework

The Theory of Planned Behavior (Figure 3.1), developed by Ajzen, provides a framework for understanding human behavior. The model posits that behavior is directly predicted by the intention to perform the behavior. In turn, intention can be predicted by the person's attitudes, subjective norms, and perceived behavioral control over the action. Ajzen further suggested that each of the model concepts were related and contributed to the eventual intention to perform the behavior (Ajzen, 2006). The concepts of the Theory

of Planned Behavior provided the structure for the instrument, The Schneider Concussion Care Survey (Schneider, 2016). The researcher ascertained that the school nurses surveyed had a lower level of comfort in assessing cognitive/ affective, as opposed to physical, symptoms in concussed athletes, felt they needed more resources to manage concussions, and experienced a lack of communication among all stakeholders involved in concussion management. Therefore, it was determined that the Theory of Planned Behavior did not provide constructs that were sufficiently detailed to provide the structure for this study.

The Decomposed Theory of Planned Behavior

Taylor and Todd (1995) developed an expanded version of the Theory of Planned Behavior, called the Decomposed Theory of Planned Behavior. This model suggests antecedents for each of Ajzen's original constructs.

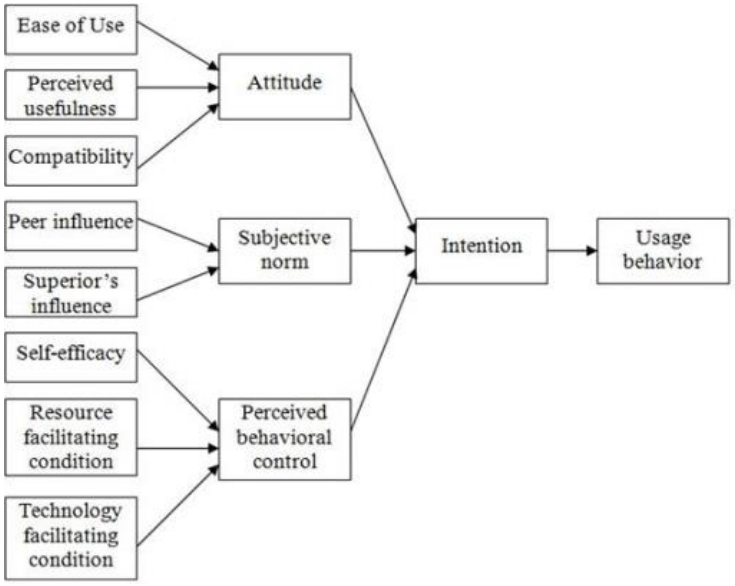

Figure 4.1. Decomposed Theory of Planned Behavior

(Permission from Taylor, S. & Todd, P.A., Understanding Information Technology Usage: A Test of Competing Models. Copyright (1995), the Institute for Operations Research and the Management Sciences, 5521 Research Park Drive, Suite 200, Catonsville, Maryland 21228 USA). (Appendix K)

Taylor and Todd (1995) posited that by decomposing the original constructs into antecedents, the relationships between each of the model's constructs became clearer. Thus, antecedents for attitude consisted of perceived usefulness and compatibility. Subjective norms were affected by peers and superiors; and perceived behavioral control was determined by self-efficacy and resources or facilitating conditions (Todd & Taylor, 1995).

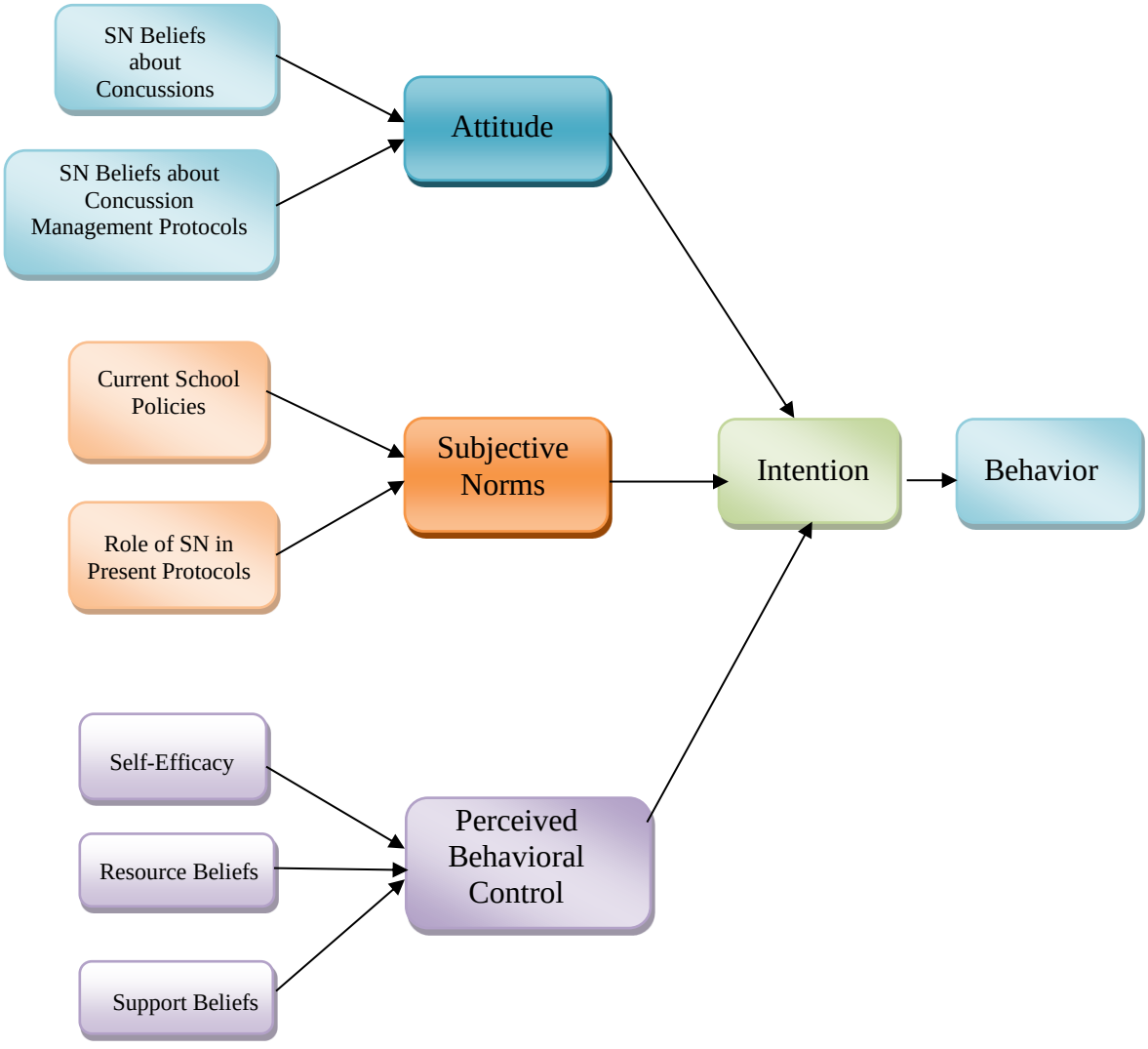

Figure 4.2. Decomposed Theory of Planned Behavior adapted to study

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Review of Literature

Increasing numbers of American youth are engaged in a variety of sports. Among athletes, children and adolescents are at highest risk for sustaining concussions (Guskiewicz & Valovich McLeod, 2011). Awareness and knowledge about concussions has grown over the last decade; nevertheless, there are gaps in the literature related to the knowledge and role of school professionals (Centers for Disease Control and Prevention, 2013). The review of literature initially presents information about the significance of concussions. Secondly, in order to capture the critical domains pertinent to the development of an instrument that examines the perceptions of school nurses in concussion management, the review of literature is further organized around the basic theoretical concepts of the Decomposed Theory of Planned Behavior (Ajzen, 2006; Taylor & Todd,1995). Each concept was examined from the purview of the school nurse and the school nurse's role in the care and treatment of students with concussions. Additionally, the intervention for this study, a SOV presentation, is described.

As many as 300,000 athletic concussions occur each year (Halstead et al., 2013). Furthermore, over the past decade, the rate of concussion-related visits to the emergency room increased by 70% and the rate of concussions that were related to sports rose 57% in those below the age of nineteen (Centers for Disease Control and Prevention, 2014). Whereas, Lincoln et al. (2011) reported that increased rates of concussions may be due to heightened awareness and improved coding, Karr et al. (2014) suggested that concussions were underreported and rates were probably much higher.

With an estimated 44 million children involved in organized sports in the United States, the rate of sports-related concussions in adolescents may be as high as 3.8 million

annually (Neal et al., 2012). Of the 200,000 athletes treated annually for concussions, 65% are between the ages of 5 and 18 years. Due to the relative size of the head compared to the rest of the body, brain water content, degree of myelination, shape of the head, and decreased neck strength; an impact delivers more force to the brain of a child than in older counterparts, which explains higher levels of concussions in the young (Neal et al., 2012).

Attitude

Beliefs about concussions. A review of published literature provided few studies that focused on the beliefs of school nurses related to concussion symptoms. One study addressed the beliefs of emergency department nurses related to concussion symptoms and consequences. Bay (2011) reported that the nurses surveyed in their study did not associate many common symptoms or consequences with concussions. In contrast, Chrisman et al. (2014) reported that coaches recognized common concussion symptoms and believed that the consequences were significant. The researchers attributed these results to the passage of the Lystedt Concussion Law in 2009, which mandated concussion training for coaches, players, and athletic trainers. The Lystedt Law does not address any training for school nurses (Washington Traumatic Brain Injury Strategic Partnership Advisory Council, 2013). White et al. (2014) found that athletic trainers had a higher level of concern about the symptoms and consequences related to concussions than coaches did, but also did not address the beliefs of school nurses. Conversely, Weber et al. (2015) found that 79.7% of school nurses surveyed agreed that concussions have the potential to affect classroom performance. Similarly, Schneider (2016) found in a pilot study, that 82% of the Texas school nurses surveyed had received formal training in

concussions and 91.5% agreed or strongly agreed that concussions have a significant impact on students' ability to perform academically.

Beliefs about concussion management protocols. Although 71% of the athletic trainers surveyed in a study by Williams et al. (2015) thought they should be part of an academic accommodation team, only 41% of the athletes whose concussions were managed by athletic trainers received academic accommodations. Additionally, most of the athletic trainers surveyed had little familiarity with individual educational plans (IEP's) or 504 accommodations. Further, athletic trainers who were not directly employed by the school district knew significantly less about accommodation processes than those employed by the schools (Williams et al., 2015). Conversely, Weber et al. (2015) conducted a study that examined school nurses' perceptions and beliefs about cognitive rest protocols in concussed students. They reported that most school nurses felt that concussed athletes were eligible to receive academic accommodations under the guidelines presented by the American with Disabilities Act. However, 45.4% of the nurses surveyed reported they did not have an academic support team or were unaware of one on their campus. Of that group, 28.5% felt that such a team was needed. Nevertheless, they reported that school nurses were more familiar with academic accommodations than athletic trainers (Weber et al., 2015). Similarly, in a pilot study of school nurses in Texas, Schneider (2016) found that 85.6% of the nurses surveyed agreed or strongly agreed that cognitive rest was important for a student's recovery from a concussion. Additionally, 85.6% agreed or strongly agreed that a gradual return-to-classroom protocol was important for a concussed student's recovery and 89% felt that these students qualified for academic accommodations (Schneider, 2016).

Subjective Norms

Current school concussion management policies. The literature abounds with reviews and research related to sideline diagnosis of concussions and recommendations for return-to-play decisions. According to The American Medical Society for Sports Medicine 2012 Position Statement, sideline concussion diagnosis and return-to-play decisions should be made by a licensed healthcare provider trained in the evaluation and management of concussions (Harmon et al., 2013). According to a study by Bell et al., (2005), 73% percent of Illinois high schools had an athletic trainer and 43% schools had a physician responsible for medical care during athletic events. Availability of the medical care providers differed between practice and games, yet only 16% of schools reported no provider available during games. Similarly, Pryor et al. (2015) reported that 70% of secondary schools provided athletic trainers at athletic games or practices. A review of published literature did not yield any articles that directly reported the role of school nurses in the acute or long-term management of concussed athletes. However, Schneider (2016) found that among school nurses surveyed in Texas, only 1% reported they were involved in concussion recognition during athletic events, 32.5% reported that their schools had formal plans for cognitive rest, 33.3% reported formal return-to-classroom protocols, and 27.4% reported that concussed students received academic accommodations.

Multiple studies addressed concussion management communication protocols. For example, McGrath (2010) suggested that after diagnosing a concussion, athletic trainers should send an email to key members of the school staff, including the school nurse, guidance counselor, teachers, and parents providing pertinent details about the

injury. McGrath also felt that emails should be sent to staff, reminding them that the student may temporarily need assistance with managing symptoms and academic demands. A review of published literature did not provide any articles that addressed the degree of compliance with these recommendations. Nonetheless, Schneider (2016) found that only 31.4% of the school nurses surveyed reported that they were routinely notified when a student was identified as having received a concussion.

Role of school nurses in concussion management. In 2012, the National Association of School Nurses (NASN) issued a position statement that directed school nurses to become active members of the team that assisted concussed students returning to school. The NASN statement further emphasized the role of school nurses as facilitators of the academic team (Diaz & Wyckoff, 2013). According to Hossler et al. (2014), a team that included the student, family, health care providers, school staff, coaches, and athletic trainers best managed concussions. School nurses should educate school faculty, counselors, and administrators about the symptoms and management of concussions, as well as the ramifications of participating in activities prematurely (McLeod, 2014). School nurses should also direct the campus in developing an emergency action plan, a concussion management plan, and a management team (McLeod, 2014).

Students may require academic accommodations upon return to school. The school nurse may need to facilitate these accommodations and guide teachers in the use of the protocol guidelines related to coursework and class attendance (Halstead et al., 2013). The school nurse, as the resident health care provider on a school campus, is in an ideal position to facilitate communication with parents and coordinate care. The nurse

also can provide education and support for the family related to concussion symptoms and management. Information provided by the parents can allow the nurse to continuously update the student's progress and appropriately revise the management program (Diaz & Wyckoff, 2013). When a student has persistent concussion symptoms, the school nurse should seek a referral to a concussion management clinic, a neuropsychologist, or a neurologist. Last, when the student is experiencing cervicogenic vertigo, the school nurse may suggest a visit to a physiotherapist or physical therapist (Reneker & Cook, 2015). Whereas, the literature addressed the recommended role of school nurses in concussion management, there were few articles that addressed their compliance with these suggestions Yet, Schneider (2016) found that only 21.4% of the nurses surveyed reported that they were members of a team that managed academic accommodation protocols for concussed students.

Perceived Behavioral Control

Self-Efficacy. While numerous articles discussed self-efficacy in nurses, only one article addressed self-efficacy in school nurses related to concussions. Weber et al. (2015) reported that 76.7% of the school nurses in their study felt that they have the ability to assist with a concussed student's return-to-classroom. Schneider (2016) found similar rates, with 88% of the school nurses in a Texas survey reporting that they felt comfortable in assessing the physical symptoms of concussed students. The same percentage reported that they were comfortable in participating or managing a formal concussion management team at their schools. However, a smaller percentage (79%) reported they were comfortable in assessing cognitive or affective symptoms in concussed students (Schneider, 2016).

Resource Beliefs. Weber et al. (2015) posited that school nurses who were assigned to multiple schools may not realistically be expected to play a major role in concussion management. Interestingly, Weber et al. (2015) also found that nurses employed at multiple schools were less familiar with academic accommodations than those who were employed at one school ($p = .027$) and 504 plans ($p = .001$). Despite the lack of further studies that supported Weber's study (2015), Schneider (2016) found that only 68.3% of the school nurses surveyed felt confident that their present work load would allow them to manage cognitive rest/gradual return-to-classroom protocols.

There are several published resource programs, such as the HeadsUp to Concussion produced by the CDC and REAP the Benefits of Good Concussion Management (Kirelik & McAvoy, 2016), yet there were no studies that examined the prevelance or efficacy of these tools among school nurses in managing return-to-learn protocols. These tools include materials that clearly delineated physical and cognitive/affective symptoms of concussions, assessment check-lists, flowsheets, or suggested academic progression protocols (Kirelik & McAvoy,2016; Centers for Disease Control and Prevention, 2013).

Support Beliefs. There were few studies found in the published literature that directly addressed the school nurses' perceptions of student athletes' or their parent's compliance with concussion management protocols. Glang et al. (2015) reported that a web-based educational model improved student and parental understanding and compliance with reporting concussion symptoms. Relatedly, Davies and Bird (2015) reported that college athletes who were unfamiliar with the severity of concussion sequelae were less likely to report symptoms after their injuries. Kroshus et al. (2015)

reported that concussed athletes in four colleges were less likely to report concussion symptoms when they felt pressured by coaches, teammates, and parents to play. There were no studies found that addressed these issues in adolescent samples. Additionally, two studies by Sandel et al. (2013 and 2015), indicated that concussed student athletes were most likely to report somatic symptoms, rather than cognitive symptoms, when reporting their recovery status. Somatic symptoms did not correlate well with cognitive or neuropsychiatric/sleep symptoms, and were therefore, deemed unreliable. Sandel et al. (2015) reported that parents most often focused on somatic symptoms as well. Despite claims made by many authors in contemporary literature that the culture of sports decreased accurate concussion reporting among athletes and their parents, there were no studies found in the literature that supported those claims (Hossler et al., 2014). While, these studies suggested influences on concussed student behavior, no studies were found that reported school nurses' perceptions of student and parent behaviors that would influence their own attitudes towards behavioral control.

Heyer et al. (2015) found that high school principals who had concussion training within the last year were more likely to provide support for training of other faculty members and provide short-term academic accommodations for concussed athletes. However, only 32% provided parents with a written academic plan following a concussion (Heyer et al., 2015). McGrath (2010) recommended that a full team was needed to implement academic accommodations for concussed students. The team described included school counselors, school psychologists, school social workers, school nurses, athletic trainers, and teachers. A review of the literature provided no articles that addressed the present role or attitudes of key administrators or faculty members. There

were also no studies that addressed the influence of other faculty members on school nurses' perceptions of behavioral control.

Despite a study by Rains et al. (2010) that reported athletic trainers and nurses had improved concussion management programs when they collaborated, the literature lacked any articles that reported the prevalence of such collaboration in American high schools or school nurses' perceptions on working with athletic trainers.

Finally, in Schneider's (2016) pilot study, it was found that school nurses in Texas perceived concussed athletes more supportive of cognitive rest/gradual return-to-classroom protocols (70.1%) than parents (64.9%). Among school personnel, school nurses anticipated more support from their principal (87.2%), followed by teachers (79.6%), then coaches (71.9%), and athletic trainers (66%).

Intention

Intention to perform a given behavior has been correlated with the actual behavior performed in many studies in the literature that have utilized the Theory of Planned Behavior or the Decomposed Theory of Planned Behavior, however, none of the studies found in the literature addressed intention of school nurses to manage concussions. Taylor and Todd (1995), found a strong correlation between behavioral intention and behavior ($r = 0.54$) in a study of technology usage in business school students. In a study that examined factors that influenced nurses to protect patients' electronic medical record privacy, Chen-Chung et al. (2016) measured only intention of behavior. The explanation provided for studying only intention was a desire to discover the educational factors that most contributed to the nurses' behavioral intention and preferring to include measurement of behavior in a later study (Chen-Chung et al., 2016). Similarly, intention

has been studied related to nursing behaviors in blood pressure monitoring (Nelson et al., 2013), practicing euthanasia in palliative care (Lavoie et al., 2016), and following recommendations related to clinical practice (Gagnon et al, 2015).

Scripted Video Presentation

Video presentations have been widely recognized as effective tools in educating nurses within schools and professional organizations. In a study by Hunt (2015), a video education intervention produced improved rates of concussion reporting and symptom recognition among athletic trainers. Although there were many studies that reported positive results after nurses viewed educational videos, there were no studies that examined the effects of videos among school nurses managing concussions (Tuong et al., 2014). However, Clayton et al. (2016) reported positive results when scripted simulation activities were used to teach research principles among PhD students in nursing. Yet, there were no articles found in the literature that directly addressed the use of scripted videos in a population of clinical or school nursing. Tuong et al. (2014) reported positive outcomes in a systematic review of studies that used videos to modify health behaviors. In the studies the authors examined, there was improved self-care in studies involving self-breast exam, prostate cancer screening, sunscreen use, HIV testing, and heart failure. The greatest impact occurred when the videos modeled the desired behavior (Tuong et al., 2014). However, there were no articles in the literature that reported using scripted videos to persuade health care providers or school administrators to modify protocols for the management of concussions or any disorders among students. However, the literature found suggests that SOV's that model a given behavior have the potential to improve behavioral scores in a study.

Gaps in the Literature

Whereas, there were many studies found in the literature that reported the symptoms of concussions or return-to-play decisions, there were fewer studies related to return-to-classroom protocols or the role of school nurses in concussion management. Carson et al. (2014) performed a chart review of 159 sports related concussed patients and found that 43.5% of the patients returned to play prematurely and 44.7% returned to school prematurely (Carson et al., 2014). Wood (2015) reported that school nurses were currently more aware of the seriousness of concussions than in previous years; which was further supported by a Texas study by Schneider (2016). However, further studies are needed to examine the attitudes of school nurses throughout the United States. More research is also needed to determine how many school nurses have received concussion management training and the role school nurses are currently assuming in concussion management country-wide. There was also a lack of information in the literature related to how the diagnosis of a sport-related concussion is communicated to parents, school nurses, or other members of the support team. Another gap discovered in the literature is how the behaviors or attitudes of athletes, parents, administrators, faculty members, or athletic staff may affect the perceived behavioral control of school nurses and how these factors may influence the actual behavior of school nurses in managing concussions. Moreover, there were no studies that examined the use of SOV's to educate nurses and demonstrate persuasive conversations that have the potential to affect their behavior in concussion management. Nor were there studies found that addressed the intention of school nurses in concussion management. By addressing these gaps in the literature, the researcher hopes to determine which factors most support school nurses in providing

concussion care as directed by the National Association of School Nurses Position Statement. By directing more attention towards the role of school nurses in cognitive rest and return-to-classroom protocols for concussed, it is hoped that this study will contribute to the science of concussion care and that concussed students will experience improved outcomes.

Conceptual and Operational Definitions

Attitude

Attitude is conceptually defined as the degree to which a person has a favorable or unfavorable evaluation of the behavior of interest, which in this case, involves concussion management (Ajzen, 2006). Further, attitude is determined by the compatibility and the perceived usefulness of the behavior of interest in the mind of the participant (Taylor & Todd, 1995). The operational definition of attitude is the sum score of questions 1-8 in the Schneider Concussion Care Survey.

Compatibility. Compatibility is conceptually defined as working well together or in agreement. In this study compatibility is defined as the degree to which the school nurse's beliefs about the effects of a concussion are compatible with what was reported in current literature. The operational definition of compatibility is the sum of questions 1-4 in the Schneider Concussion Care Survey.

Perceived Usefulness. Perceived Usefulness is conceptually defined as the degree to which a process or protocol is considered effective (Taylor & Todd, 1995). In this study, perceived usefulness is defined as the degree to which a school nurse feels concussion protocols are useful measures in treating a concussed student. The

operational definition of perceived usefulness is the sum of questions 5-8 in the Schneider Concussion Care Survey.

Subjective Norms

Subjective Norms are conceptually defined as the customary codes of behavior in a group of people (Ajzen, 2006). The antecedents of subjective norms are peer and superior influences on behavior (Taylor & Todd, 1995). The operational definition of subjective norms is the sum score of questions 9-16 of the Schneider Concussion Care Survey.

Superior Influence. Superiors are conceptually defined as those who provide professional guidelines for behavior. In this case, school principals, school districts, and professional organizations provide the guidelines for concussion management policies. In this study, this construct is referred to as current school policies related to concussion management. Operationally, the construct is defined as the sum score of questions 9-12 of the Schneider Concussion Care Survey.

Peers Influence. Peers are conceptually defined as stakeholders involved in concussion management, which include teachers, coaches, and athletic trainers. The peers influence the behavior of the school nurse, which is conceptually defined as the school nurse's current role in concussion management. Operationally, the school nurse's current role or "peer-influenced" behavior is defined as the sum score of questions 13-16 of the Schneider Concussion Care Survey.

Perceived Behavioral Control

Perceived Behavioral Control is conceptually defined as a person's perception of the ease or difficulty of performing the behavior of interest (Ajzen, 2006). Three

constructs that the Decomposed Theory of Planned Behavior suggest contribute to Perceived Behavioral Control are Self-Efficacy, Support Beliefs, and Resource Beliefs (Taylor & Todd, 1995). The operational definition of Perceived Behavioral Control is the sum score of questions 17-30 of the Schneider Concussion Care Survey.

Self-efficacy. Self-efficacy is conceptually defined as the degree to which individuals feel confident in their ability to perform a given behavior (Ajzen, 2006). In this study, self-efficacy is defined as the degree to which the school nurse feels confident in assessing concussion symptoms and managing concussion protocols. The operational definition of Self-efficacy is the sum of the scores from questions 17-21 of the Schneider Concussion Care Survey.

Resource Beliefs. The conceptual definition of Resource Beliefs is the degree to which the school nurse believes that there are adequate tools to successfully assess concussed students and lead a concussion management team within the school environment. The operational definition of Resource Beliefs is the sum of the scores from questions 22-24 of the Schneider Concussion Care Survey.

Support Beliefs. Support Beliefs are conceptually defined as the degree to which the school nurse perceives that athletes, parents, coaches, athletic trainers, teachers, and principals will support cognitive rest and return-to-classroom protocols for concussed students. This definition also encompasses the school nurse's perceptions about stakeholders' support for a school nurse-led concussion management team. The operational definition for Support Beliefs is the sum of the scores from questions 25-30 of the Schneider Concussion Care Survey.

Intention

Intention is conceptually defined as the desire or commitment to carry out a given behavior. The Theory of Planned Behavior posits that behavior is a direct reflection of intention (Ajzen, 2006). Operationally, intention is the sum score of questions 31-38 of the Schneider Concussion Care Survey.

Scripted Video Online Presentation

The conceptual definition of an online video is, "a sequence of images processed electronically into an analog or digital format and displayed on a screen with sufficient rapidity as to create the illusion of motion and continuity" ("Video," n.d., para 1). The definition of scripted refers to a manuscript that is used in a "play or production" ("Scripted," n.d., para 1).

The operational definition of SOV presentation is the interventional video that will be viewed by participants as an embedded component of the Schneider Concussion Management Survey. The video displayed a check-list that school nurses can use during symptom assessments, as well as educational information about concussions, cognitive rest, and return-to-classroom protocols (Appendix L). Additionally, the video modeled a persuasive conversation a school nurse is having with her principal, with the goal of establishing a concussion management team in their school.

Research Hypotheses

Using The Decomposed Theory of Planned Behavior the following hypotheses were examined:

H_1 = The Interventional Group receiving a SOV will demonstrate significantly higher changes in behavior scores than the Attention Control Group receiving a Power Point over time.

H_2 = The Interventional Group will demonstrate significantly higher changes in self-efficacy scores than the Attention Control Group.

H_3 = The Interventional Group will demonstrate significantly higher changes in attitude scores than the Attention Control Group.

H_4 = The Interventional Group will demonstrate significantly higher changes in perceived behavioral control scores than the Attention Control Group.

H_5 = The Interventional Group will demonstrate significantly higher changes in intention scores than the Attention Control Group.

Research Question: What are the relationships among major studied constructs (attitude, self-efficacy, resource beliefs, perceived behavioral controls, intent) and behavior change?

Table 4.1. Study Hypotheses.

HYPOTHESIS	IV'S	DV	Level
H_1 = The Interventional Group receiving a SOV will demonstrate significantly higher changes in behavior scores than the Attention Control Group receiving a Power Point over time.	SOVP PP	Intention	DV = continuous
H_2 = The Interventional Group receiving a SOV will demonstrate significantly higher changes in self-efficacy scores than the Attention Control Group.	SOVP PP	Self-efficacy	DV = continuous
H_3 = The Interventional Group receiving a SOV will demonstrate significantly higher changes in attitude scores than the Attention Control Group.	SOVP PP	Attitude	DV = continuous
H_4 = The Interventional Group receiving a SOV will demonstrate significantly higher changes in perceived behavioral control scores than the Attention Control Group.	SOVP PP	PBC	DV = continuous
H_5 = The Interventional Group receiving a SOV will demonstrate significantly higher changes in intention scores than the Attention Control Group.	SOVP PP	Intention	DV = continuous

SOVP = scripted online video presentation; PP = power point; DV = dependent variable; IV = independent variable; PBC = perceived behavioral control

Design

An experimental pretest-posttest design, with participants randomly assigned to two groups (SOV and traditional power point), was utilized to determine the effect of a SOV presentation on the variables of the Decomposed Theory of Planned Behavior. Because the number of school nurses who are currently involved in concussion care management is small and because of the small number of concussions that typically occur during the length of this study, intention of the school nurses to manage concussion care was examined in place of actual behavior in the initial survey. The experimental group viewed a SOV presentation that modeled a conversation between a school nurse and her principal and the control group viewed a traditional power point. Additionally, each of the constructs of the theory were examined to determine how they influenced the behavioral intentions of school nurses in managing the return-to-classroom protocols in concussed students, as well as demographic information. A post-test survey was

administered 28 days after the initial survey to measure changes in each of the subscale scores and determine whether school nurses conducted conversations with their principal.

Methods

Sample

A convenience sample of middle school and high school nurses was used for this study. The only exclusion criteria were for school nurses who work at schools that do not have athletics or physical education programs, or those who could not read English. The sample size required, determined by G-Power analysis for repeated measures MANOVA with two groups, a medium effect size (f = .25), α = .05, and power of .80, was 98 (Faul et al., 2007). Therefore, a sample of 49 was adequate for each group. The justification for using a medium effect size was found in prior studies that examined intent. Arnold and DeJong (2015) had a similar study design, using post-intervention testing with a sample of 190 young adults. They reported significantly higher intention scores in the intervention group ($p < 0.001$). The intervention group had a mean = 71.3, SD = 53; whereas, the control group had a mean = 24, SD = 25. The calculated Cohen's d = .74678, with a medium to large effect size (r = 0.3498). In another study that used a medium effect size to study hand-washing intentions, the researchers reported that their measures were sensitive to between-group differences and that that pattern of differences was in the expected direction, with stronger intentions in the intervention group (Miller et al., 2012). Finally, Gagnon et al. (2015) also utilized an effect size of 0.25 to determine the required sample size in their study on the intentions of nurses to follow recommendations in preventative clinical practice, reporting significant correlations between the constructs of the Theory of Planned Behavior.

A larger sample size than required was recruited for each group to account for attrition. School nurses were recruited through the membership rosters of the National Association of School Nurses (NASN). Participants were invited through the NASN's newsletter, which was distributed to 35,000 members of NASN. The invitation was extended in two subsequent newsletters and each newsletter contained a link to the survey.

Informed consent was established through the completion of the survey. Additionally, permission for the study was granted by the NASN research committee. The benefits of participation included obtaining a potentially useful tool that will assist nurses in forming a concussion management team and managing the return-to-classroom protocols for concussed students, as well as making a valuable contribution to the development of further research in concussion care management behavior. The study participants were also informed that all data will be kept confidential and stored on encrypted files. IRB approval from the University of Texas at Tyler was obtained prior to data collection.

Instruments

The instrument used was the Schneider Concussion Care Survey originally created using Ajzen's guidelines for the Theory of Planned Behavior (Ajzen, 2006). Following pilot testing of the instrument, the original set of questions were revised and additional questions added in response to the feedback provided by an expert reviewer panel. The piloted scale had a high level of internal consistency ($\alpha = 0.851$).

The revised Schneider Concussion Care Management Survey consisted of 38 Likert-style questions. The instrument had the same three domains as the survey in the

pilot (attitude, subjective norms, and perceived behavioral control), however the revised survey also measured intention to improve communication in concussion care management. Additionally, each domain was divided into the constructs of the Decomposed Theory of Planned Behavior (Taylor & Todd, 1995). Each question had five choices, with a possible range of 1-5; total scores range from 38-190. A panel of experts evaluated the revised survey. Two experts are professors of nursing, with experience as school nurses, and one expert is a professor of nursing with expertise in developing instruments that measure self-efficacy.

Procedures

The survey was be distributed to all members of the NASN (n=35,000) through a link posted in their weekly newsletter and was posted twice. Participants who accessed the link and agreed to complete the survey were randomly assigned to view either a SOV or a power point presentation at the conclusion of the Qualtrics® survey. The power point that the attention control group received was developed to include the same educational information as the video, without the conversation between the principal and school nurse (Table 4.2). All participants completed the pretest survey and then one half of the group viewed the SOV presentation and the other half viewed a standard power point. A final question asked participants to provide a follow-up email address to receive a link to the posttest survey. The survey was disseminated through Qualtrics®, which randomly determined which participants viewed the video and which participants viewed the power point. The survey was kept open for one month. Finally, participants completed a follow-up survey 28 days after the first survey. The follow-up survey measured post-intervention scores and behavior (participation in conversation with their

principal) A reminder email to complete the survey was sent two weeks after the first email.

Table 4.2. Comparison of Scripted Online Video Presentation and Power Point Topics.

Topic	SOV	Power Point
Significance of problem	X	X
RTP guidelines	X	X
Team collaboration for management	X	X
Mechanism of injury	X	X
Physical symptoms	X	X
Cognitive/Emotional Symptoms	X	X
Individuality of management	X	
Cognitive rest	X	X
Gradual return-to-classroom	X	X
Academic accommodations	X	X
Importance of communication	X	X
Consequences of premature return to academics	X	X
National recommendations for management teams	X	X
Management team members	X	
CDC Handouts	X	
Educate faculty recommendation	X	
Model conversation	X	

Analysis

The results from Qualtrics® were imported to IBM SPSS Statistics version 20.0 for statistical analysis. Data analyses were conducted in two phases. First, all study variables were examined using descriptive statistics, such as, means, standard deviation, and minimum/maximum values for continuous variables and frequencies and percentages for categorical variables. Next, hypotheses 2-5, which examined between groups and over time, were analyzed using repeated measures MANOVA to examine if pretest scores to posttest scores changed at a statistically significant level by study group. These hypotheses examined whether the intervention group had higher change scores in self-efficacy, attitude, perceived behavioral control, and intention. A Chi Square analysis was

used to examine hypotheses 1, which examined whether the intervention group had higher scores for the behavior, communication with the principal. Pearson Correlation was utilized to examine the relationships between study variables and intention. Spearman's rho was used to examine the relationships between study variables and behavior.

Results

Assumption testing was conducted, including checks of normality and linearity. There were also no undue effects of outlier scores. Subsequently, the data met the requirements for parametric testing for hypotheses 2-5. Nonparametric testing was employed to address hypothesis one and the research question, due to the dichotomous values in the survey question related to behavior change.

The psychometric properties of the study instrument were assessed, including a reliability analysis to assure an appropriate level of internal consistency. The data indicated that the majority of scales within the instrument had a level of internal consistency well above the standard of Cronbach's alpha of .70. The only exception was "Beliefs about Resources", a 3-item scale, that indicted a somewhat low level of internal consistency at pretest (Cronbach Alpha = .67) and posttest (Cronbach Alpha = .69) (Table 4. 4).

Although 35,000 members of NASN were sent the link electronically, it is unknown how many actually viewed the survey. There were 298 participants who completed the pretest survey, with 149 in each group. The post-test was completed by 114 participants. There were no missing data points among the participants who completed both surveys.

Descriptive Analysis

A descriptive analysis of categorical study variables was performed (Table 4.3). The majority of participants were employed at a public and a high school, had a bachelor of science in nursing (BSN) or higher degree, and had received concussion training

Table 4.3. Descriptive Analysis of Categorical Study Variables (*n*=114)

Variable	Intervention Group N = 58 (50.9%)	Control Group N = 56 (49.1%)
Highest level school you are a school nurse?		
Middle School	19 (32.8%)	19 (33.9%)
High School	39 (67.2%)	37 (66.1%)
Level of Education		
LVN	2 (3.4%)	0
ADN	10 (17.2%)	5 (13.2%)
BSN	28 (48.3%)	40 (71.4%)
APN	18 (31%)	11 (19.6%)
Level of School		
Public	53 (91.4%)	46 (82.1%)
Private	5 (8.6%)	10 (17.9%)
Region of School		
Urban	7 (12.1%)	7 (12.5%)
Suburban	31 (53.4%)	29 (51.8%)
Rural	20 (34.5%)	20 (35.7%)
School Population		
<200	5 (8.6%)	4 (7.1%)
201-500	10 (17.2%)	11 (19.6%)
501-1000	22 (37.9%)	23 (41.1%)
1001-2000	13 (22.4%)	15 (26.8%)
2001-3000	8 (13.8%)	2 (3.6%)
>3000	0	1 (1.8%)
Concussion Training		
Yes	48 (82.8%)	50 (89.3%)
No	10 (17.2%)	6 (10.7%)
Notified of Concussion		
Yes	49 (84.5%)	50 (89.3%)
No	9 (15.5%)	6 (10.7%)

School nurses and counselors were present at school most frequently. Athletic trainers were present at school less frequently. Psychologists and social workers (*n*=40; 35.10%) were present at school the least frequently (Figure 4.3).

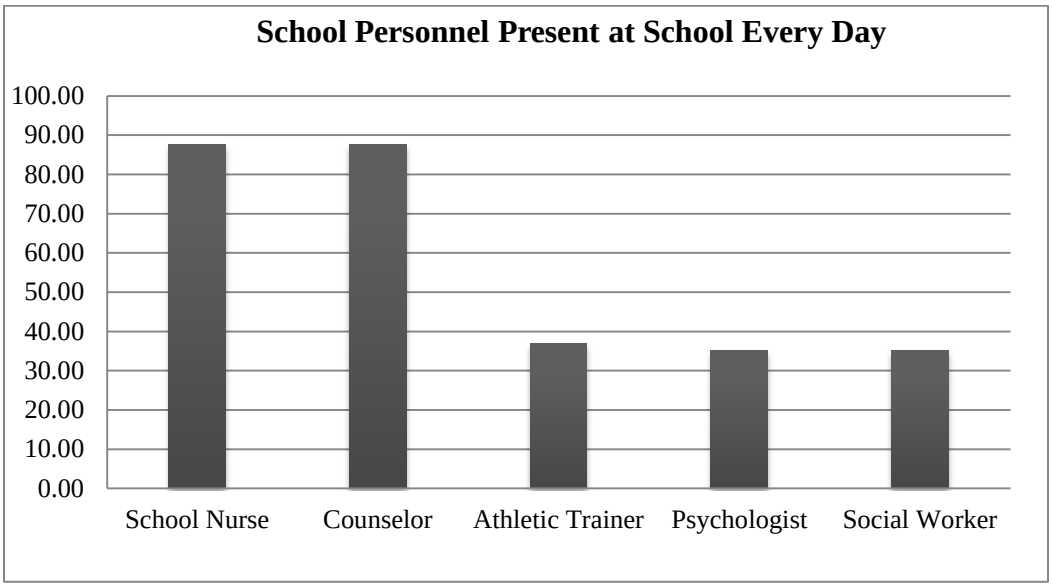

Figure 4.3. Comparison of school personnel present at school by percentages (*n*=114)

A descriptive analysis of continuous study variables pretest and posttest scores is displayed in (Table 4.4).

Table 4.4. Descriptive Analysis of Continuous Study Variables Pretest/Posttest (*n*=114)

Variable	Mean (SD)	Min/Max	Potential Range	Cronbach's Alpha
Attitude				
Pretest	4.60 (.66)	1.00-5.00	1.00-5.00	.94
Posttest	4.49 (.59)	1.00-5.00	1.00-5.00	.97
Self-Efficacy				
Pretest	4.39 (.62)	2.60-5.00	1.00-5.00	.85
Posttest	4.41 (.62)	2.00-5.00	1.00-5.00	.87
Perceived Behavioral Control				
Pretest	4.07 (.55)	2.29-5.00	1.00-5.00	.87
Posttest	4.07 (.54)	2.50-5.00	1.00-5.00	.88
Beliefs About Resources				
Pretest	3.78 (.76)	1.67-5.00	1.00-5.00	.67
Posttest	3.79 (.82)	1.67-5.00	1.00-5.00	.69
Intentions For Return-To-Classroom				
Pretest	4.29 (.61)	2.13-5.00	1.00-5.00	.81
Posttest	4.25 (.60)	2.00-5.00	1.00-5.00	.84

Repeated Measures MANOVA Analysis

Table 4.5 and Table 4.6 present a repeated measures MANOVA analysis of changes in study pretest to posttest scores for outcome variables. Data indicated that pretest to posttest changes did not evidence a statistically significant level for Attitude, Perceived Behavioral Control, Self-Efficacy, Beliefs About Resources, *or* Intentions for Return-To-Classroom.

Table 4.5. Repeated Measures MANOVA of Changes in Study Pretest/Posttest Scores

Variable	N	Pretest M (SD)	Posttest M (SD)	F(df)	p
Attitude				**1.37 (1,114)**	**.24**
Intervention	58	4.47 (.71)	4.27 (.98)		
Control	56	4.73 (.59)	4.72 (.60)		
Self-Efficacy				**1.85 (1,114)**	**.36**
Intervention	58	4.39 (.66)	4.37 (.72)		
Control	56	4.38 (.58)	4.44 (.50)		
Perceived Behavioral Control				**.10 (1,114)**	**.75**
Intervention	58	4.04 (.53)	4.03 (.62)		
Control	56	4.09 (.57)	4.10 (.45)		
Beliefs about Resources				**.02 (1,114)**	**.88**
Intervention	58	3.74 (.77)	3.73 (.88)		
Control	56	3.83 (.75)	3.85 (.76)		
Intentions for Return-To-Classroom				**.14 (1,114)**	**.71**
Intervention	58	4.26 (.63)	4.24 (.61)		
Control	56	4.31 (.58)	4.26 (.60)		

Table 4.6. Repeated Measures MANOVA of Changes in Study over Time

Variable	Sum of Squares	df	Mean Square	F	p
Attitude					
Time	.59	1	.59	1.44	.23
Time * Study Group	.56	1	.56	1.37	.24
Error	45.60	114	.41		
Self-Efficacy					
Time	.02	1	.02	.21	.65
Time * Study Group	.09	1	.09	.85	.36
Error	12.46	114	.11		
Perceived Behavioral Control					
Time	.00	1	.00	.00	1.00
Time * Study Group	.01	1	.01	.10	.75
Error	7.85	114	.07		
Beliefs about Resources					
Time	.00	1	.00	.00	.96
Time * Study Group	.00	1	.00	.02	.88
Error	21.50	114	.19		
Intentions for Return-To-Classroom					
Time	.08	1	.08	.62	.43
Time * Study Group	.02	1	.02	.14	.71
Error	13.78	114	.12		

Chi Square Test

A Chi Square test was performed to examine behavior (communication with the principal) scores by study groups. The intervention group viewed the video and the control group viewed a power point. Data indicated that there was not a significant difference in the behavior of the two groups ($X^2 = .092$, $p = .762$).

Spearman's Rho Correlation Analysis

A Spearman's Rho Correlation analysis was performed to examine the correlation of the behavior (conversation with the principal) to other study variables (Table 4.7). Attitude was shown to have no significant correlation to behavior ($r_s = .08$, $p > .05$), but did have a small correlation to intention ($r_s = .34$, $p < .01$). On the other hand, behavior had a significant small effect size correlation to self-efficacy ($r_s = .23$, $p < .05$), perceived behavioral control ($r_s = .29$, $p < .01$), and belief in resources ($r_s = .26$, $p < .01$). Behavior had a significant moderate correlation to intention ($r_s = .33$, $p < .01$). Finally, self-efficacy had moderate level correlations to belief in resources ($r_s = .43$, $p < .01$) and intention ($r_s = .46$, $p < .01$); as well as a strong correlation to perceived behavioral control ($r_s = .74$, $p < .01$).

Table 4.7. Spearman's rho Correlation of Behavior to Other Study Variables (n=114)

Variable	**1**	**2**	**3**	**4**	**5**	**6**
1. Behavior	1.00	.08	.23*	.29**	.26**	.33**
2. Attitude		1.00	.17	.28**	.24*	.34**
3. Self-Efficacy			1.00	.74**	.43**	.46**
4. Perceived Behavioral Control				1.00	.76**	.60**
5. Beliefs about Resources					1.00	.50**
6. Intention						1.00

* indicates statistical significance at the $p<.05$ level
** indicates statistical significance at the $p<.01$ level

Discussion

Although the results of this study did not indicate that the intervention had a strong effect on behavior, there were several interesting findings. First, it was determined that the majority of school nurses were well trained, with 86% having BSN's and concussion training. Open-ended questions about concussion training revealed that the sources of the training received included the CDC training for Health Care Professionals, programs written by districts for their nurses, and programs created by athletic trainers within the district for coaches, school nurses, and athletic trainers. School nurses were also on campus more frequently than other faculty members. In this study, it was found that the school nurses throughout the United States were notified about students incurring concussions (87%) than the Texas school nurses in a prior study (Schneider, 2016). This increase in notifications may be due to geographic differences or improved communication protocols that occurred over the time between the two studies.

Other gaps in the literature were also addressed. It was determined that school nurses perceived principals as most supportive of the development of a concussion care management team, followed by athletic trainers, then students, coaches, teachers, and parents last. Additionally, school nurses had high mean levels of intention to provide a quiet environment for concussed students to rest and to refer students to concussion specialists if their symptoms persisted (4.53). Their mean intention scores for improving communication with parents related to monitoring students' symptoms (4.36) was similar to mean scores for training teachers to recognize concussion symptoms (4.35). Lower scores were noted for school nurses' intentions to persuade teachers to postpone exams (4.23) or working with the athletic staff to apprise them of student progress (4.02).

The analyses that examined the changes and correlations in study variables also had some significant findings. The highest mean scores were found in attitudes (towards the importance of concussion symptoms and concussion management protocols). The ceiling effect of this variable may well account for the lack of correlation between attitude and the other study variables. The scores for the majority of study variables did not increase from pretest to posttest, which may be due to the short time between tests or a possible increase in motivation, attitude, and knowledge of those who chose to respond. The variable that did show a modest increase over time was self-efficacy. This increase occurred in both the intervention and control groups. It is possible that both media presentations reinforced prior knowledge and motivation to engage in concussion protocols. It was also interesting to note that improved self-efficacy scores were correlated to improved scores in perceived behavioral control, resource beliefs, and intention. Thus, despite the desired effect of the intervention in this study, future studies should be directed at interventions that improve self-efficacy of the school nurses in order to achieve the desired outcomes of improved return-to-learn management. Finally, there was a correlation between intention and behavior in this study. The lack of data to support improved behavioral changes may be due to the short duration of this study or the time of year that the study occurred. However, this finding not only supports the theory, but indicates that future studies that employ this theory and instrument are warranted.

Strengths and Limitations

The study included threats to validity including history, mortality, and statistical conclusion validity. In order to address threats to history, all school nurses were asked in the survey to disclose any events that may have occurred during the study that influenced

their behavior, such as having a child who experienced a concussion recently. There was no correlation between individuals who reported that someone close to them sustained a concussion and those who had conversations with their principal about concussion care management, $r(114)=.12$, $p=.21$ Threats to mortality were addressed by choosing the "forced entry" option on each question in Qualtrics® and offering a chance at winning an Amazon gift card for all school nurses who completed the survey. Threats to statistical conclusion validity were addressed by determining the a priori statistical power for the study at 0.8 and oversampling to provide an adequate sample size.

Another weakness included the use of an untested survey instrument. The original instrument had strong reliability and validity scores; however, the instrument for this study was revised based on the findings from the pilot study (Schneider, 2017). In order to address this weakness, the revised instrument was reviewed by a panel of experts. Additionally, the pretest did not address actual behavior, but the intention of behavior, which may not be a true prediction of actual behavior. Prior studies that showed strong correlations between intention and behavior, most notably Rigby (2013), who examined concussion care management among athletic trainers; as well as Arnold and DeJong (2016), who studied melanoma interventions in young adults, addressed this weakness. The findings from this study also supported the correlation between intention and behavior.

Further, the participants who participated in the study may not be representative of the target population. The small percentage of pretest participants who completed the post-test (38%) may not accurately represent the sample surveyed. Additionally, the Decomposed Theory of Planned Behavior and the operational definitions of the

constructs used may not capture the factors that influence the school nurse's intent, which is a threat to construct validity. However, the demographics in this study indicated that the participants were representative of school nurses in other studies. The study variables in this study also added support to the theory.

Strengths of the study included addressing significant gaps in the literature, small risks to the participants, and the use of an instrument that had psychometric properties tested in a pilot study. Additionally, participants were given access to educational resources that can be used in their schools to improve concussion management. No other studies found in the literature addressed the variables that affected the behavior of school nurses in concussion management. Whereas, videos have been used in other populations, were no prior studies that examined its efficacy in the population of school nurses, nor with the purpose of examining the intentions of school nurses in concussion care management.

Conclusion

The increased incidence of concussions and an increased awareness of long-term consequences has made concussion management of adolescents a priority concern for school nurses. However, many variables have made it difficult for nurses to participate in managing the protocols recommended in the literature and provided by the CDC. The study explored the variables that affected the perceptions and behavioral intentions of school nurses. Additionally, this study examined the efficacy of a SOV presentation, a tool that may provide a resource that school nurses need to manage return-to-classroom transitions for concussed students. Although the results of this study do not indicate that the intervention had a significant effect on the intention or behavior of school nurses to

manage concussion care, the Schneider Concussion Care Survey was tested and shown to be a reliable instrument. Finally, the study took place during late October through early January, a very busy time of the year for school nurses, which may have interfered with the behavioral responses.

The current study may not have contributed an intervention that contributes to the science of nursing in concussion care management, but the results do provide information that will guide future research. School nurses were determined to be the team member most frequently on school campuses and although they were involved in concussion care management, their role in assisting students in their return-to-classroom transition should continue to expand. Further research should explore how this role can be improved and how collaboration among all stakeholders can be improved, which in turn will contribute to better outcomes for concussed adolescents.

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Chapter 5

Summary of Research

This emerging program of research focuses on concussion care management. Guided by both The Theory of Planned Behavior and The Decomposed Theory of Planned Behavior, this research examined the interactions of attitudes, subjective norms, and perceived behavioral control with the intentions and behavior of school nurses in leading a concussion management team. The concept analysis on cognitive rest, presented in Chapter 2, defined one of the key aspects of concussion care. The analysis revealed challenges in prescribing rest, especially within the adolescent population. Additionally, defining cognitive rest, helped to define current protocols in return-to-learn protocols that can guide school nurses.

Because of anecdotal perceptions on the state of concussion care management within schools and a lack evidence to substantiate the perceptions, a pilot study was conducted to determine current practices and school nurses' perceptions related to current protocols within the state of Texas. Furthermore, a new instrument, The Schneider Concussion Care Survey, was developed and tested. The results of this pilot study were presented in Chapter 3.

The results of the pilot study were used to revise The Schneider Concussion Care Survey and to expand the study nationally, which was reported in Chapter 4. An intervention, a SOV, was also developed to address one of the concerns discovered in the prior study, a lack of communication. The video was an intervention that was not

previously found in the literature in the context of concussion care management. Whereas, the hypotheses related to behavior change were not supported, there were several factors revealed in the study that will be addressed in subsequent steps in the program of research. Finally, the validity of the instrument, The Schneider Concussion Care Survey, was supported.

Lessons Learned

School nurses comprised the sample population in both the pilot study and the interventional study. While school nurses have been identified as key members of the concussion management team, other stakeholders have a great deal of influence in the intentions and behaviors of school nurses. In many cases, school nurses reported that they were not able to engage in assisting students in their transition to return-to-learn, because they were not notified when a student incurred a concussion. Although the relationships between athletic trainers and school nurses have improved in concussion care, some participants reported conflicts in the roles of athletic trainers and school nurses in managing concussed students. School nurses also reported perceptions that their workload was too heavy to engage in any other projects (mean score = 3.2). This was the lowest score among beliefs about resources, followed by possessing materials to assist students in returning to the classroom (3.9). Providing the CDC's checklist and flowcharts may provide SN's with the later needed resources. The timing of this study was not ideal, as late fall may be one of the busiest times of the year in schools for nurses. This may have affected the responses of the participants. Finally, during the interventional study, the researcher learned that some states do not employ nurses in their schools, which may have further affected the results.

Next Steps in Research

Further research will build upon the concept analysis and the lessons learned in the pilot study and interventional study. The development of The Schneider Concussion Care Survey will continue with a confirmatory factor analysis and distribution among other populations. Future studies will examine the influence of geography by including that factor in the demographic questions per group. Also, future studies will examine the the status of any concussion management protocols that exist within the schools in more detail. In general, the range of scores was not very wide, therefore in future studies, the use of either a 7-point Likert-scale or a visual analog will be considered to give greater sensitivity to the instrument.

A SOV presentation remains an intriguing intervention and further applications are warranted. The video utilized in this study modeled communication with a significant member of the concussion care team. It also had an educational component to improve knowledge of the symptoms, sequelae, and need for cognitive rest and recognized return-to-classroom protocols. However, when Hunt (2015) utilized a concussion-education video to measure athlete's knowledge, he found that the rate of reporting prior concussions increased. In addition to discussing the symptoms of concussions, the video showed clips that demonstrated hits in athletic events that could cause concussions and the effect concussions had in the lives of some young athletes. Incorporating the human-connection in Hunt's video may provide the emotional motivation that will impact the results of future studies.

Both of the studies conducted in the present program of research were quantitative, however, due to the huge variability in the symptomology, prognosis, and

attitudes of the many stakeholders in concussion care, qualitative studies may provide valuable information to guide the formation of evidence-based practice as well as future quantitative studies. Finally, both qualitative and quantitative studies that examine the impact of concussions on student academic performance are clearly warranted.

Conclusions

As the number of children who engage in sports continues to grow, it is unlikely that the rate of concussions will decline. Many experts endorse the promotion of a climate of safety in youth sports; however, this would require an entire culture change in youth athletics, which is quite challenging. Current laws are state statues, and whereas they have improved concussion management in some areas, their guidelines are quite diverse. Federal regulations would correct this disparity and address the lack of injury registration and tracking, which would allow health care professionals to research the results of interventions and form more effective evidence-based guidelines for care. Additionally, consistent national training and standard return-to-learn protocols for school nurses would help improve disparity in this area as well. However, the findings from this study and all other studies being conducted by dedicated health care professionals will continue to add to the state of science in concussion care management, especially as it related to return-to-learn protocols. Hopefully, through continued research, the health and well-being of concussed youths will continue to improve.

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Appendix A: Journal of School Nursing Acceptance Letter, *Cognitive Rest: An Integrated Literature Review*

The Journal of School Nursing - Decision on Manuscript ID JSN-15-08-143

Sun 8/30/2015, 3:57

Dear Ms. Schneider:

It is a pleasure to accept your manuscript entitled "Cognitive Rest: An Integrated Literature Review" for publication in the The Journal of School Nursing.

In order to begin production on your manuscript for publication, we need you to complete the Contributor Form online (copyright form). A link will be sent to you shortly explaining how to fill out the form online. Please do so as quickly as possible. I look forward to publishing your article in The Journal of School Nursing.

Sincerely,

Julia Muennich Cowell, PhD, RNC, FAAN

Executive Editor
The Journal of School Nursing
jcowell@nasn.org

Appendix B: Permission for Publication of Article in Dissertation

From: Binur, Michelle [mailto:Michelle.Binur@sagepub.com] **On Behalf Of** permissions (US)
Sent: Monday, July 25, 2016 3:41 PM
To: Pond, Meredith; Julia Cowell
Cc: kschneider@patriots.uttyler.edu
Subject: RE: Permission requested

Dear Kathleen,

Thank you for your request. You may use the published version of your article (version 3) in the printed version of your dissertation. However, if you wish to post your dissertation online, you must use the version of your article that was accepted by the journal (version 2), or the version you originally submitted to the journal (version 1).

Please note that this permission does not cover any 3rd party material that may be found within the work. You must properly credit the original source, *The Journal of School Nursing*. Please let us know if you have further questions.

Best regards,

Michelle Binur

Rights Coordinator
SAGE Publishing
2455 Teller Road
Thousand Oaks, CA 91320
USA

Appendix C: Schneider Concussion Care Survey in Pilot Study

Demographics

1) How many years have you been a school nurse? ☐
2) What is your level of education?
   - Licensed Vocational Nurse ☐
   - Associate Degree Nurse ☐
   - Bachelors of Science in Nursing ☐
   - Advanced Practice Nurse ☐
3) Is your school:
   - Public ☐
   - Private ☐
4) Is your school:
   - Urban ☐
   - Suburban ☐
   - Rural ☐
5) How many students attend your school?
   - Less than 200
   - 201-500
   - 501-1000
   - 1001-2000
   - 2001-3000
   - >3001
6) Please indicate how often the following are present in your school:

	Every day	Some days	Rarely or never
School Nurse	☐	☐	☐
Athletic Trainer	☐	☐	☐
Psychologist	☐	☐	☐

7) Have you had any formal training or continuing education related to concussions?
   - Yes ☐
   - No ☐

Appendix C: Schneider Concussion Care Survey in Pilot Study (Continued)

Attitude

Please rate your level of agreement for each of the statements below:
(1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree)

1) Concussions have a significant effect on a student's ability to perform academically.
2) Cognitive rest is important for a student's recovery from a concussion.
3) Gradual return-to-the-classroom is important for a student's recovery from a concussion.
4) Concussed students qualify for academic accommodations during their recovery.
5) School nurses should coordinate a team effort for a student's cognitive rest/ the transition back to the classroom protocol.

Please rate your comfort level or willingness to participate in each of these situations:

(1 = not at all comfortable, 2 = slightly uncomfortable, 3 = slightly comfortable, 4 = fairly comfortable, 5 = very comfortable)

6) How comfortable do you feel assessing the physical symptoms (headache, nausea/vomiting, dizziness, sensitivity to light or sound) associated with concussions in a student?
7) How comfortable do you feel assessing the cognitive or affective symptoms (confusion, feeling "foggy", anxious, irritable, unable to sleep) associated with concussions in a student?
8) How willing are you to participate in the management of concussions?

Subjective Norms

1) Who most often diagnoses a concussion at your school athletic events?
   - Athletic trainer
   - Physician
   - Coach
   - School Nurse
   - Other (please explain)

Please rate how frequently each of these occur at your school:
(1 = never, 2 = rarely, 3 = occasionally, 4 = usually, 5 = routinely)

2) When a student is diagnosed with a concussion, the school nurse is notified.

3) When a student has been diagnosed with a concussion, the return-to-play decision is made by a health care provider.
4) Our school has a formal plan for a cognitive rest protocol.
5) Our school has a formal plan for a gradual return-to-classroom protocol.
6) There is a formal team who makes academic accommodations for concussed students.

7) There is a formal team who makes academic accommodations for concussed students, which includes the school nurse.

8) What role does the school nurse play in the management of concussions at your school?

Perceived Behavioral Control

Please rate how confident you are with each of the following:
(1 = not at all confident, 2 = not very confident, 3 = slightly confident , 4 = fairly confident, 5 = very confident)

1) A concussed athlete would follow a cognitive rest/ transitional return-to-classroom protocol?

2) A concussed athlete's parent(s) would support a cognitive rest/ transitional return-to-classroom protocol?

3) Your principal(s) would support a cognitive rest/ transitional return-to-classroom protocol?

4) The teachers at your school would support a cognitive rest/ transitional return-to-classroom protocol?

5) The coaches at your school would support a school nurse led cognitive rest/ transitional return-to-classroom protocol?

6) How confident are you that the athletic trainers at your school would support a school nurse led cognitive rest/ transitional return-to-classroom protocol?

7) How confident are you that your workload would allow you to lead a cognitive rest/ transitional return-to-classroom protocol?

8) What does your school need to support a successful return-to-classroom protocol?

Please feel free to make any comments that you would like to make related to this topic or study.

Appendix D: Institutional Review Board Approval for *An Instrument to Measure the Role of School Nurses in Concussion Management*

THE UNIVERSITY OF TEXAS AT TYLER
3900 University Blvd. • Tyler, TX 75799 • 903.565.5774 • FAX: 903.565.5858

Office of Research and Technology Transfer

Institutional Review Board

January 31, 2016

Dear Ms. Schneider,

Your request to conduct the study: *An Instrument to Measure the Role of School Nurses in Concussion Management: A Pilot Study*, IRB #Sp2016-51 has been approved by The University of Texas at Tyler Institutional Review Board as a study exempt from further IRB review. This approval includes a waiver of signed, written informed consent. In addition, please ensure that any research assistants are knowledgeable about research ethics and confidentiality, and any co-investigators have completed human protection training within the past three years, and have forwarded their certificates to the IRB office (G. Duke).

Please review the UT Tyler IRB Principal Investigator Responsibilities, and acknowledge your understanding of these responsibilities and the following through return of this email to the IRB Chair within one week after receipt of this approval letter:

- Prompt reporting to the UT Tyler IRB of any proposed changes to this research activity
- **Prompt reporting to the UT Tyler IRB and academic department administration will be done of any unanticipated problems involving risks to subjects or others**
- Suspension or termination of approval may be done if there is evidence of any serious or continuing noncompliance with Federal Regulations or any aberrations in original proposal.
- Any change in proposal procedures must be promptly reported to the IRB prior to implementing any changes except when necessary to eliminate apparent immediate hazards to the subject.

Best of luck in your research, and do not hesitate to contact me if you need any further assistance.

Sincerely,

Gloria Duke, PhD, RN

Gloria Duke, PhD, RN
Chair, UT Tyler IRB

Appendix E: Journal of School Nursing Acceptance Letter, *Psychometric Evaluation of a New Instrument to Evaluate School Nurses' Perceptions on Concussion Care Management*

The Journal of School Nursing - Decision on Manuscript ID JSN-16-11-202.R2

The Journal of School Nursing

Mon 12/5/2016, 3:53 PM

05-Dec-2016

Dear Ms. Schneider:

It is a pleasure to accept your manuscript entitled "Psychometric Evaluation of a New Instrument to Evaluate School Nurses' Perceptions on Concussion Care Management" in its current form for publication in The Journal of School Nursing.

In order to begin production on your manuscript for publication, we need you to complete the Contributor Form online (copyright form). A link will be sent to you shortly explaining how to fill out the form online. Please do so as quickly as possible.

I look forward to publishing your article in The Journal of School Nursing.

Sincerely,

Julia Muennich Cowell, PhD, RNC, FAAN
Executive Editor
The Journal of School Nursing
jcowell@nasn.org

Appendix F: Script for Online Video Presentation

Setting: Principal's office in a middle school or high school.

Characters present: Mrs. Erin Perez – school principal

Ms. Sonia Smith – school nurse

SS: Thank you so much, Mrs. Perez for seeing me today. I have a topic to discuss with you that is really important. As I'm sure you know, concussions are becoming a bigger problem among adolescents and I think we can do a better job helping these students recover.

EP: Really, I thought our athletic staff was doing a good job with that.

SS: Actually, our athletic trainers and coaches are doing a good job recognizing when a concussion occurs and preventing a student from reentering the athletic event until a physician clears them. But I am concerned about how we are helping a student transition back into the classroom after a concussion. I think if we formed a team to manage this process and we all work together, we can address the problems these students are having.

EP: Why is it harder for a student with a concussion to return to school than a student with any other athletic injury?

SS: That's a great question. Concussions, unlike a broken ankle, doesn't show up on an x-ray or any other imaging study. The injury isn't actually structural, but functional. You see, when a concussion occurs, the damage is at the cellular level. The injury causes a release of signals within the brain that cause the cells to release potassium. In turn, calcium enters the cells, which can cause those cells to die. In order to restore a healthy balance in the cells, the brain needs extra energy,

but unfortunately, the injury also causes decreased blood flow to the brain. So, there is a real energy crisis within the student's brain. This is why so many of these students describe feeling like their brain is working slowly or they are so exhausted. Studies also show that students with concussions not only have physical symptoms, like dizziness and headache, but trouble with concentration and processing information. They also can have difficulty sleeping and experience higher rates of depression.

EP: Oh, I didn't realize that. So is this really a problem?

SS: Absolutely. Just like any other area of the body that is injured, the brain needs time to rest. Doctors refer to what is needed as cognitive rest. The student actually needs to rest their brain during this energy crisis by refraining from reading, texting, using a computer, or doing anything mentally taxing. One study found that students who gradually returned to the classroom recovered in about a month, but those who returned to school too soon took up to five times longer to recover.

EP: So are you saying they should miss school?

SS: Not all students are the same. That's the difficult thing about concussions, not all students have the same symptoms and not all students need the same exact treatment. That's why we need a team of people who understand how concussions work to individualize the protocol that a given student needs. Some may stay home and rest for only a day and others need longer. But most of them need to return to academic activities gradually – not all at once. And some of

these students need to have extended time to complete assignments or postpone quizzes and tests.

EP: So how do we know what a given student needs?

SS: Well…what I'm proposing is that first, we make sure that I'm notified any time a student is diagnosed with a concussion. We can meet with our athletic trainers and get them on board and we can work on ways to let our parents know to notify us when their student gets a concussion outside of school.

EP: OK, we can do that.

SS: Then, as soon as the student has been cleared to return to school, I will meet with that student and assess them for concussion symptoms. (SHOW CHECKLIST, See Appendix L) If the student is not having any symptoms presently, they are cleared to go to class for a few hours. Then they return to see me. If they are still doing OK, they go back to class. If they are having symptoms, they can lie down in my clinic for an hour or so and try again. Similarly, if they are having problems with assignments, we can arrange with their teachers for academic accommodations.

EP: Like a 504?

SS: Exactly….we can postpone some assignment or exam dates to allow the student time to recover. We certainly don't want these students to fail exams or do poorly on the state standardized tests because of a concussion.

EP: Oh…I hadn't thought about that. That's a really good point. We want all our students to be successful. But aren't you concerned that the student might not tell you when they are struggling in class? We have so many students taking AP classes and they never want to get behind.

SS: Great point. Yes, that is one of the difficulties of assessing a student with a concussion, they have to self-report their symptoms. But I think if I explain to the student that pushing too hard, too soon will actually cause their brain to heal more slowly, we can address that concern. Also, I am more than happy to conduct a session with our teachers to help them understand what to look for, and they can help assess the student as well. We have wonderful teachers at this school and I think if they understand the issue they will be quite supportive.

EP: Yes, we really do have an exceptional faculty here. I do have one more question….what are other schools doing about this problem?

SS: It's pretty inconsistent. Some schools have already established concussion management teams and others are pretty much in the same boat we're in – trying to establish teams. But the National Association of School Nurses issued a position statement encouraging school nurses to become much more involved in concussion care. The majority of school nurses have now received training in concussion management and we are in an ideal situation to address this problem. Not only because we are trained in patient assessment, but we are familiar with academic accommodations and we have clinics where students can come to rest quietly until they are ready to return to class. The CDC also recommends that all

schools create a formal plan to help students successfully return to the classroom, with a collaborative team to form an individualized plan. According to the American Academy of Pediatrics, a school-based concussion management team should consist of a school nurse, counselor, psychologist, social worker, athletic trainer, coach, teachers, and a school physician, when one is available.

EP: Hmm…that does make sense. Well, you have given me a great deal to think about. How about I get back to you later this week?

SS: That's a great idea…and while you are giving it some more thought, I'll leave you with these brochures that talk a bit more about concussions, cognitive rest, and return-to-classroom protocols. They were issued by the CDC and I think you will find them quite helpful. (SHOW CDC HANDOUT, Appendix L).

EP: Sounds good – I'll talk with you again soon.

SS: Thanks so much for your time. Have a great day!

Appendix G: Revised Schneider Concussion Care Survey

Thank you for agreeing to take this 38-question survey. Your answers will provide valuable information.

ATTITUDE:

Please rate your level of agreement for each of the statements below:
(1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree)

Beliefs about Concussions:

1) Concussions have a significant effect on a student's ability to perform academically.
2) Concussions can interfere with a student's ability to attend school.
3) Concussions can interfere with a student's ability to sleep.
4) A student with a concussion may have different symptoms than other students with concussions.

Beliefs about concussion management protocols:

5) Cognitive rest is important for a student's recovery from a concussion.
6) Gradual return-to-the-classroom is important for a student's recovery from a concussion.
7) Concussed students qualify for academic accommodations during their recovery.
8) School nurses should coordinate a team effort for a student's cognitive rest/ the transition back to the classroom protocol.

SUBJECTIVE NORMS:

Current School Policies:

9) Who most often diagnoses a concussion at your school athletic events?
   Athletic trainer
   Physician
   Coach
   School Nurse
   Other (please explain)

Appendix G Revised Schneider Concussion Care Survey (Continued)

Please rate how frequently each of these occur at your school:
(1 = never, 2 = rarely, 3 = occasionally, 4 = usually, 5 = routinely)

10) Our school has a formal plan for a cognitive rest protocol.

11) Our school has a formal plan for a gradual return-to-classroom protocol.

12) There is a formal team who makes academic accommodations for concussed students.

Role of school nurse in concussion protocols:

13) The school nurse is part of a formal team which makes academic accommodations for concussed students.

14) The school nurse assesses a concussed student periodically after return-to-classroom.

15) The school nurse communicates with the parents about concussion symptoms a student experiences outside of school.

16) The school nurse provides an area for a concussed student to rest during the school day as they tradition back to the classroom.

PERCEIVED BEHAVIORAL CONTROL:

Self-efficacy for Concussion Management

Please rate your confidence in participating in each of these situations:

(1 = not at all confident, 2 = slightly unconfident, 3 = slightly confident, 4 = fairly confident, 5 = very confident).

17) How confident do you feel assessing the physical symptoms (headache, nausea/vomiting, dizziness, sensitivity to light or sound) associated with concussions in a student?

18) How confident do you feel assessing the cognitive or affective symptoms (confusion, feeling “foggy”, anxious, irritable, unable to sleep) associated with concussions in a student?

19) How confident do you feel providing education to your teachers about concussions?

20) How confident do you feel speaking to your principal about a concussion management team?

21) How confident do you feel about leading a concussion management team?

Resource Beliefs:

Please rate your beliefs related to each of the statements below:
(1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree)

22) I have resources that will help me educate teachers about concussions.

23) I have resources that will help me manage a return-to-classroom protocol.

24) My workload would allow me to lead a cognitive rest/ transitional return-to-classroom protocol.

Support Beliefs:

Please rate your beliefs related to each of the statements below:
(1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree)

25) A concussed student will follow a cognitive rest/ transitional return-to-classroom protocol?

26) A concussed student's parent(s) will support a cognitive rest/ transitional return-to-
classroom protocol?

27) My principal(s) will support a cognitive rest/ transitional return-to-classroom protocol?

28) The teachers at my school will support a cognitive rest/ transitional return-to-classroom protocol?

29) The coaches at my school will support a school nurse led cognitive rest/ transitional return-to-classroom protocol?

30) The athletic trainers at my school will support a school nurse led cognitive rest/ transitional return-to-classroom protocol?

Appendix G Revised Schneider Concussion Care Survey (Continued)

INTENTION:

Please rate your intention to participate in the following activities with each of the following:

(1 = very unlikely, 2 = somewhat unlikely, 3 = somewhat likely , 4 = fairly likely, 5 = very likely)

31) I will speak with my principal about beginning or improving an existing concussion management team at my school.

I will work with parents to insure good communication between the family and the school nurse related to concussed students.

32) I will work with teachers to make sure that they understand the symptoms and academic problems experienced by concussed students.

33) I will work with collaboratively with teachers to monitor concussion symptoms as concussed students transition back to the classroom.

34) I will provide a quiet environment for a concussed student who is unable to remain in class for extended periods of time.

35) I will work with teachers to adjust postpone assignment/test dates when a concussed student is having symptoms.

36) I will work with the athletic staff to apprise them of a concussed athlete's progress in return-to-classroom protocols.

37) I will refer students to concussion specialists when a student is having prolonged symptoms.

Demographics

1) How many years have you been a school nurse? ☐
2) What is your level of education?
   - Licensed Vocational Nurse ☐
   - Associate Degree Nurse ☐
   - Bachelors of Science in Nursing ☐
   - Advanced Practice Nurse ☐
3) Is your school:
   - Public ☐
   - Private ☐

Appendix G Revised Schneider Concussion Care Survey (Continued)

4) Is your school:
   - Urban ☐
   - Suburban ☐
   - Rural ☐

5) How many students attend your school?
   - Less than 200
   - 201-500
   - 501-1000
   - 1001-2000
   - 2001-3000
   - >3001

6) Please indicate how often the following are present in your school:

	Every day	Some days	Rarely or never
School Nurse	☐	☐	☐
Athletic Trainer	☐	☐	☐
Psychologist	☐	☐	☐

7) Have you had any formal training or continuing education related to concussions?
   - Yes ☐
   - No ☐

8) When a student is diagnosed with a concussion at your school, are you notified?
   - Yes ☐
   - No ☐

9) Have any events occurred related to concussions recently that influenced your answers?
   - Yes ☐
   - No ☐

10) Has anyone close to you experienced a concussion in the last year?
   - Yes ☐
   - No ☐

Post-test Questions (added to Pre-test questions used previously) – will be sent to those who agreed to one month follow-up survey):

BEHAVIOR

38) Did you participate in a conversation with your principal related to your role in concussion management?

Yes ☐

No ☐

39) In the prior survey, did you watch a video or a power point?

Video ☐

Power point ☐

Appendix H: Institutional Review Board Approval for Effects of a Scripted Online Video on School Nurse Perceptions of Concussion Management

THE UNIVERSITY OF TEXAS AT TYLER
3900 University Blvd. • Tyler, TX 75799 • 903.565.5774 • FAX: 903.565.5858

Office of Research and Technology Transfer

Institutional Review Board

October 12, 2016

Dear Ms. Schneider,

Your request to conduct the study: *Effects of a Scripted Online Video on School Nurse Perceptions of Concussion Management,* IRB #F2016-14 has been approved by The University of Texas at Tyler Institutional Review Board as a study exempt from further IRB review. This approval includes a waiver of signed, written informed consent. In addition, please ensure that any research assistants are knowledgeable about research ethics and confidentiality, and any co-investigators have completed human protection training within the past three years, and have forwarded their certificates to the IRB office (G. Duke).

Please review the UT Tyler IRB Principal Investigator Responsibilities, and acknowledge your understanding of these responsibilities and the following through return of this email to the IRB Chair within one week after receipt of this approval letter:

- Prompt reporting to the UT Tyler IRB of any proposed changes to this research activity
- **Prompt reporting to the UT Tyler IRB and academic department administration will be done of any unanticipated problems involving risks to subjects or others**
- Suspension or termination of approval may be done if there is evidence of any serious or continuing noncompliance with Federal Regulations or any aberrations in original proposal.
- Any change in proposal procedures must be promptly reported to the IRB prior to implementing any changes except when necessary to eliminate apparent immediate hazards to the subject.

Best of luck in your research, and do not hesitate to contact me if you need any further assistance.

Sincerely,

Gloria Duke, PhD, RN

Gloria Duke, PhD, RN
Chair, UT Tyler IRB

Appendix I: Permission for Survey Distribution
National Association of School Nurses

Erin Maughan <emaughan@nasn.org>

Mon 10/3/2016, 8:50 PM

Kathleen,

The reviewers have finished have provided feedback for your survey. It was decided to move forward and this will go in our weekly newsletter—it goes to 35,000 (so actually goes to a much broader group). The newsletter is sent out electronically-every week.. They did include some suggestions to your survey (attached) for you to think about and some general feedback that I wanted to pass along:

- Some of the questions use nonspecific terms which leave room for subjective interpretation
- Use consistent language (student vs. athlete) throughout survey
- The intention questions assume the current program, communication, and understanding is poor and needs improvement-what if it is already a great program-they can't indicate that. Same is true in some of the support questions—'will support'-what if it exists already?

These suggestions were given in the spirit of tightening your questions so you get the type of responses wanted.

Our understanding is the study is focusing on a training program which will lead to better SN interventions. Since the focus is on the training program it does not meet one of the critical priorities of NASN research. Trained school nurses is important and so we are willing to send via our weekly digest to recruit school nurses-you can then do the randomization into two groups, etc from there. (a reminder explanation about this is found on our website here).

Please let me know if you have any questions.

Regards,

-Erin

Erin D. Maughan, PhD, MS, RN, APHN-BC, FNASN, FAAN
RWJF (Robert Wood Johnson Foundation) Executive Nurse Fellow Alumni
Director of Research
National Association of School Nurses
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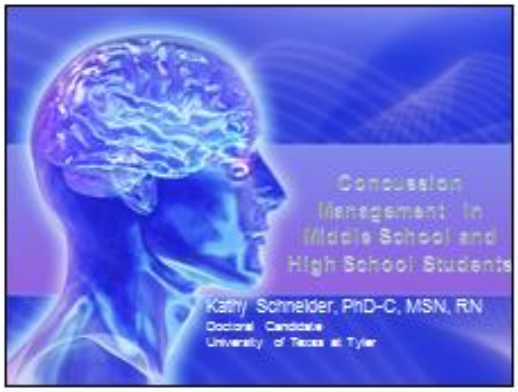
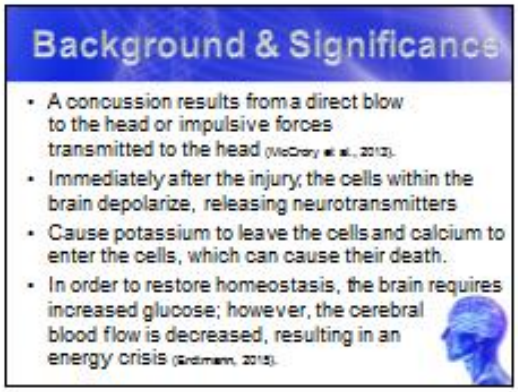
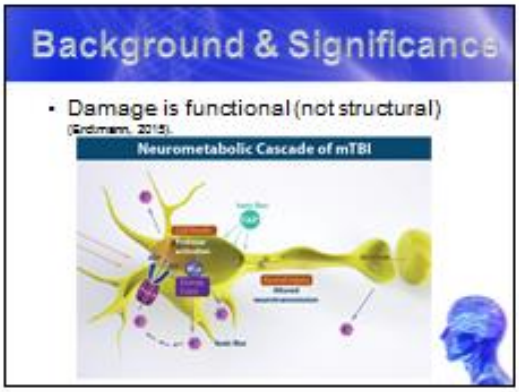
Appendix J: Power Point for Attention Control Group







What are We Doing About it?

- CDC – created Heads Up Program to educate coaches, athletes, parents about concussion identification and management (Centers for Disease Control and Prevention, 2007).
- All 50 states have passed laws related to return to play
- Result – coaches, athletic trainers, parents, and players receive training in recognition of concussions
- Concussed athlete may not return-to-play the same day as concussion occurs and must be cleared by health care professional.
- Emphasis on safer play (Centers for Disease Control and Prevention, 2007).

What Do We Need to Do About It?

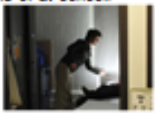
- Metabolic disparity and decreased cerebral blood flow account for symptoms concussed students experience (Erdmann, 2015; Sarmiento et al., 2012).
- Schedule of cognitive rest and gradual return-to-classroom recommended to allow brain to heal.
- In order to rest cognitively, an individual needs to refrain from any activities that are mentally challenging (McLeod & Gioia, 2012).
- Those who immediately return to school take up to 100 days longer to recover than those who engage in low to moderate level of cognitive activity, who take 20-50 days to recover (Brown, 2014).
- 44.7% concussed students return to school too soon

What is Cognitive Rest?

- The human brain never actually rests. The question then becomes, what activities must be eliminated for meaningful cognitive rest to occur?
- The activities that must be limited or eliminated:
  - Using a computer, reading, texting, taking notes, watching television, playing video games, and talking on the phone.
- Bright lights and loud music must be eliminated to promote cognitive rest (Halstead et al., 2013).

What is Cognitive Rest?

- Acceptable activities: napping, meditation, listening to soft music or audiobook, take slow walks outside, or gently play with pets (Moser et al., 2015).
- Most importantly, important to release the resting individual from assignments or the pressure of obligations (Nunt & Michal, 2002).
- When symptom-free, may progress to short interval (30–45 min) learning sessions at home or at school.
- Between school sessions, rest in the nurse's office (Halstead et al., 2013).

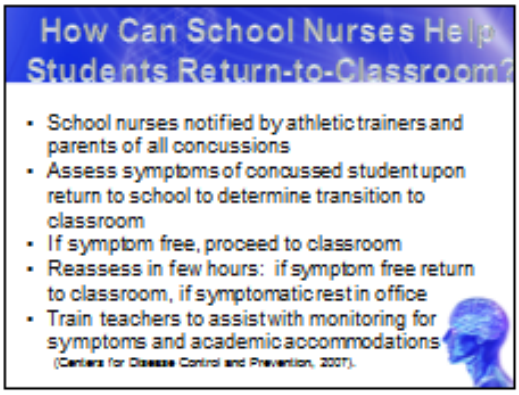


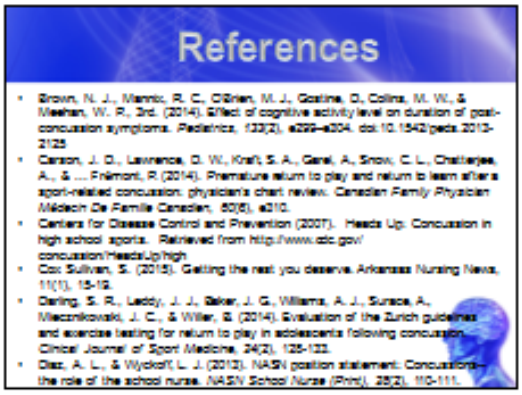
What is Cognitive Rest?

- Some academic subjects better tolerated than others: continuously monitor the student's symptoms and adjust the schedule to decrease exposure to classes that exacerbate symptoms.
- Noisy areas may need to be eliminated from initial schedule (band, gym) and may require extra time to get to class to avoid noisy hallways.
- May need preprinted notes or a designated note taker.
- Postpone examinations and major assignments or administer verbal assessments (Halstead et al., 2013).
- If academic adjustments >3 weeks may make academic accommodations under Section 504 of the Rehabilitation Act of 1973 (U.S. Department of Labor, 1973)

How Can School Nurses Help Students Return-to-Classroom?

- National Association of School Nurses issued position statement directing school nurses to become more involved in concussion care management in 2012
- School nurses perceive their school principal as the most supportive of return-to-classroom protocols (have conversation with principal)
- Establish team to individualize plans for concussed students' return-to-classroom (Centers for Disease Control and Prevention, 2007).


How Can School Nurses Help Students Return-to-Classroom?
• School nurses notified by athletic trainers and parents of all concussions
• Assess symptoms of concussed student upon return to school to determine transition to classroom
• If symptom free, proceed to classroom
• Reassess in few hours: if symptom free return to classroom, if symptomatic rest in office
• Train teachers to assist with monitoring for symptoms and academic accommodations
(Centers for Disease Control and Prevention, 2007).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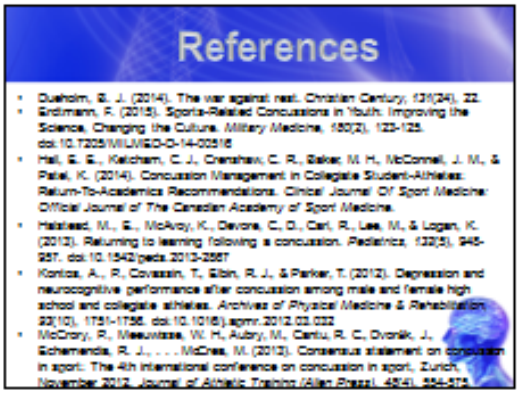
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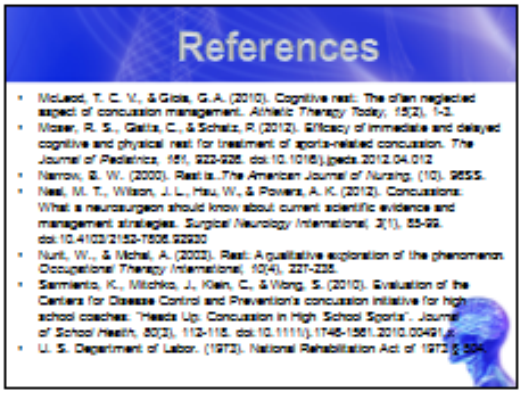
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Appendix K: Permission for Use of Decomposed Theory of Planned Behavior

Dear Kathleen,

Permission is granted to use the material from the article cited below in your dissertation at no charge:

RE: Shirley Taylor, Peter A. Todd, (1995) Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research* 6(2):144-176.

Please use the following credit line:

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All the best,

Kimberly

Kimberly Anoweck

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Appendix L: CDC Heads Up to Concussions Program

Concussion Signs and Symptoms

Checklist

HEADS UP SCHOOLS

KNOW YOUR CONCUSSION ABCs

Student's Name: _____ **Student's Grade:** _____ **Date/Time of Injury:** _____

Where and How Injury Occurred: *(Be sure to include cause and force of the hit or blow to the head.)* _____

_____

Description of Injury: *(Be sure to include information about any loss of consciousness and/or how long, memory loss, or seizures following the injury, or previous concussions, if any. See the section on Danger Signs on the back of this form.)* _____

_____

_____

DIRECTIONS:

Use this checklist to monitor students who come to your office with a head injury. Students should be monitored for a minimum of 30 minutes. Check for signs or symptoms when the student first arrives at your office, fifteen minutes later, and at the end of 30 minutes.

Students who experience one or more of the signs or symptoms of concussion after a bump, blow, or jolt to the head should be referred to a health care professional with experience in evaluating for concussion. For those instances when a parent is coming to take the student to a health care professional, observe the student for any new or worsening symptoms right before the student leaves. Send a copy of this checklist with the student for the health care professional to review.

To download this checklist in Spanish, please visit: www.cdc.gov/Concussion.
Para obtener una copia electrónica de esta lista de síntomas en español, por favor visite: www.cdc.gov/Concussion.

OBSERVED SIGNS	0 MINUTES	15 MINUTES	30 MINUTES	☐ MINUTES last prior to leaving
Appears dazed or stunned				
Is confused about events				
Repeats questions				
Answers questions slowly				
Can't recall events prior to the hit, bump, or fall				
Can't recall events after the hit, bump, or fall				
Loses consciousness (even briefly)				
Shows behavior or personality changes				
Forgets class schedule or assignments				
PHYSICAL SYMPTOMS				
Headache or "pressure" in head				
Nausea or vomiting				
Balance problems or dizziness				
Fatigue or feeling tired				
Blurry or double vision				
Sensitivity to light				
Sensitivity to noise				
Numbness or tingling				
Does not "feel right"				
COGNITIVE SYMPTOMS				
Difficulty thinking clearly				
Difficulty concentrating				
Difficulty remembering				
Feeling more slowed down				
Feeling sluggish, hazy, foggy, or groggy				
EMOTIONAL SYMPTOMS				
Irritable				
Sad				
More emotional than usual				
Nervous				

→ More

Danger Signs:

Be alert for symptoms that worsen over time. The student should be seen in an emergency department right away if s/he has:

- ❒ One pupil (the black part in the middle of the eye) larger than the other
- ❒ Drowsiness or cannot be awakened
- ❒ A headache that gets worse and does not go away
- ❒ Weakness, numbness, or decreased coordination
- ❒ Repeated vomiting or nausea
- ❒ Slurred speech
- ❒ Convulsions or seizures
- ❒ Difficulty recognizing people or places
- ❒ Increasing confusion, restlessness, or agitation
- ❒ Unusual behavior
- ❒ Loss of consciousness (even a brief loss of consciousness should be taken seriously)

Additional Information About This Checklist:

This checklist is also useful if a student appears to have sustained a head injury outside of school or on a previous school day. In such cases, be sure to ask the student about possible sleep symptoms. Drowsiness, sleeping more or less than usual, or difficulty falling asleep may indicate a concussion.

To maintain confidentiality and ensure privacy, this checklist is intended only for use by appropriate school professionals, health care professionals, and the student's parent(s) or guardian(s).

For a free tear-off pad with additional copies of this form, or for more information on concussion, visit: www.cdc.gov/Concussion.

Resolution of Injury:

___ Student returned to class
___ Student sent home
___ Student referred to health care professional with experience in evaluating for concussion

SIGNATURE OF SCHOOL PROFESSIONAL COMPLETING THIS FORM: _____

TITLE: _____

COMMENTS:

For more information on concussion and to order additional materials for school professionals FREE-OF-CHARGE, visit: www.cdc.gov/Concussion.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

WHAT ARE THE SIGNS AND SYMPTOMS OF A CONCUSSION?

The signs and symptoms of concussion can show up right after an injury or may not appear or be noticed until hours or days after the injury. Be alert for any of the following signs or symptoms. Also, watch for changes in how the student is acting or feeling, if symptoms are getting worse, or if the student just "doesn't feel right."

SYMPTOMS REPORTED BY STUDENT:

EMOTIONAL:
- Irritable
- Sad
- More emotional than usual
- Nervous

THINKING/REMEMBERING:
- Difficulty thinking clearly
- Difficulty concentrating or remembering
- Feeling more slowed down
- Feeling sluggish, hazy, foggy, or groggy

SLEEP*:
- Drowsy
- Sleeps less than usual
- Sleeps more than usual
- Has trouble falling asleep

*Only ask about sleep symptoms if the injury occurred on a prior day

PHYSICAL:
- Headache or "pressure" in head
- Nausea or vomiting
- Balance problems or dizziness
- Fatigue or feeling tired
- Blurry or double vision
- Sensitivity to light or noise
- Numbness or tingling
- Does not "feel right"

SIGNS OBSERVED BY SCHOOL STAFF:

- Appears dazed or stunned
- Is confused about events
- Answers questions slowly
- Repeats questions
- Can't recall events prior to the hit, bump or fall
- Can't recall events after the hit, bump or fall
- Loses consciousness (even briefly)
- Shows behavior or personality changes
- Forgets class schedule or assignments

DANGER SIGNS

Be alert for symptoms that worsen over time. A student should be seen in an emergency department right away if s/he has:

- One pupil (the black part in the middle of the eye) larger than the other
- Drowsiness or cannot be awakened
- A headache that gets worse and does not go away
- Weakness, numbness, or decreased coordination
- Repeated vomiting or nausea
- Slurred speech
- Convulsions or seizures
- Difficulty recognizing people or places
- Increasing confusion, restlessness, or agitation
- Unusual behavior
- Loss of consciousness (even a brief loss of consciousness should be taken seriously)

Appendix M: Permission to Adapt Instrument Used in Rigby Study

Justin Rigby <justinrigby2@weber.edu>

9/8/2015Kathleen Schneider

Inbox

Kathleen,

You are more than willing to adapt my instrument and modify it any way that works best for your study. Good luck with everything.

Justin H. Rigby, PhD, ATC
Assistant Professor
Weber State University
Department of Athletic Training and Nutrition
801-626-6526

justinrigby2@weber.edu

Appendix N: Biographical Sketch

NAME Kathleen Holligan Schneider	POSITION TITLE Doctoral Candidate The University of Texas at Tyler Tyler, Texas
eRA COMMONS USER NAME (credential, e.g., agency login)	

EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	MM/YY	FIELD OF STUDY
Kent State University	BSN	03/1974	Nursing
University of Texas at Tyler	MSN	05/2003	Nursing/ Education
University of Texas at Tyler	PhD	05/2017	Nursing

A. Personal Statement

My long term research goals center on improving outcomes in concussed youth athletes and factors that improve comprehensive, multidisciplinary concussion care management protocols. I received my undergraduate degree in nursing at Kent State University, where I served as an announcer for the gymnastics team. I pursued a career as a pediatric nurse and Health Science instructor in high school. In these roles, I observed a pattern of behavioral and cognitive issues that persisted in students who had concurred concussions in the past. The academic training I received at The University of Texas at Tyler during my master's program gave me valuable experience in understanding the pathophysiology of concussions and developing a health promotion program with student athletes related to concussion recognition and treatment. As I continued at The University of Texas at Tyler in the doctoral program, I gained valuable experience in research methodologies that have permitted me to develop a program of research in my area of interest. I have gained perspective and knowledge as I disseminated my findings in two articles and as a speaker at a cognitive behavioral therapy conference.

B. Positions and Honors

Positions

Associate Professor	Austin Community College	2003 - present
Health Science Instructor	McNeil High School	2005 – 2013
Health Science Instructor	Cypress Falls High School	2004 – 2005
Health Science Instructor	A&M Consolidated High School	2000 - 2004
Staff RN	College Station Medical Center	1999 - 2000
Nurse, Lactation Consultant	Dean Medical Center	1994 - 1999
NICU, Mother-Baby Nurse	Meriter Medical Center	1985 - 1999
Staff RN	Children's Hospital of LA	1984
Office Nurse	Havasu Pediatrics	1983 - 1984

Office Nurse	Dr. D. Hagerman, Dermatology	1980 -1983
Instructor CNA Course	Mohave Community College	1979 - 1982
Staff RN	Lake Havasu Community Hospital	1977 - 1978
Staff, Charge RN	Akron Childrens' Hospital	1976 - 1977
Baccalaureate Instructor	Kent State University	1975 - 1976
Staff, Charge RN	Cleveland Clinic Foundation	1974 - 1975

Honors

Teaching Excellence Award Nomination – Austin Community College, May 2016
Outstanding HSTE Teacher State of Texas 2008
THOA Distinguished Teacher Award 2006
THOA Scholarship 2005
Who's Who Teachers 2003-2005
Area 2 New HSTE Teacher of the year 2003

C. Professional Memberships

National League for Nursing (NLN)
Sigma Theta Tau (International Nursing Honor Society)
Alpha Chi National College Honor Society
Texas Community College Teachers Association

D. Publications and Presentations

Publications

Schneider, K. H. (2017). Psychometric evaluation of a new instrument to evaluate school nurses' perceptions on concussion care management. *The Journal of School Nursing.* 1059840516686842. doi:10.1177/1059840516686842

Schneider, K. H. (2016). Cognitive rest: A integrated literature review. *Journal of School Nursing (Sage Publications Inc.), 32*(4), 234-240. doi:10.1177/1059840515607344

Schneider, K. H. (1993). Fostering success in breastfeeding couples. *International Journal of Childbirth Education, 8*(4), 18-20.

Presentations:

Cognitive Rest in Concussed Adolescents: International Conference on Cognitive Behavioral Therapy, Philadelphia, Pennsylvania; June 2016.

Medical Terminology; Nursing in the USA, Tzu Chi College, Hualein, Taiwan, May 2015

Panel Presentation: Health Science Technology Professional Development Conference, Certification Programs in High School, July 2008

Appendix N: Biographical Sketch (Continued)

Best Practices Presentation: Dr. Seuss Introduces Medical Ethics, Health Science Technology Professional Development Conference, July 2007

Best Practices Presentation: Using Games to Teach Financial Management and Problem Solving in High School, Health Science Technology Professional Development Conference, July 2006

Promoting Breastfeeding Presentation: Dean Medical Clinic Pediatric Nursing Staff, 1998